

BLACKWATER FLOOD CONTROL RESERVOIR

Webster and Salisbury, New Hampshire

Forest Management Plan

Master Plan Appendix B

and

Fish and Wildlife Management Plan

Master Plan Appendix D

Jointly Prepared By

State of New Hampshire

Department of Resources and Economic Development

Division of Forests and Lands

Concord, New Hampshire

and

Department of the Army

New England Division, Corps of Engineers

Operations Division

Waltham, Massachusetts

Feb '81

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# DISPOSITION FORM

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REFERENCE OR OFFICE SYMBOL

NEDOD-P

SUBJECT

Master Plans, Appendices B & D, Forest, Fish and Wildlife Management Plan, Blackwater Dam

TO See Distribution

FROM Acting Chief, Ops. Div. DATE 17 Sept 1981

CMT 1

1. The subject appendices, prepared in accordance with ER 1130-2-400, dated May 1971 has been approved by the Division Engineer.
2. The plan has been developed to increase the value of reservoir lands for recreation and wildlife, and to promote natural ecological conditions by following accepted conservation practices.
3. This plan has been developed in coordination with the New Hampshire Department of Resources and Economic Development.

Incl  
As Stated



J.C. WONG  
Acting Chief, Operations Division

Distribution:

- (2) CDR USACE (DAEN-CWO-N)  
WASH D.C. 20314
- (15) Operations Division, NED
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- (1) Engineering Division, NED
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SUBJECT

Master Plan, Appendices B and D, Forest and Fish and Wildlife Management Plan, Blackwater Reservoir

TO Division Engineer

FROM Chief, Operations  
Division

DATE 22 December 1980 CMT 1  
Mr. Mitchell/jb/305

1. Inclosed for your approval is the Forest and Fish and Wildlife Management Plan for Blackwater Reservoir. This plan will serve as Appendices B and D to the Master Plan for this project.

2. It has been prepared in accordance with ER 1130-2-400, dated 28 May 1971. It has been reviewed by NED Planning, Engineering and Real Estate Divisions and the New Hampshire Department of Resources and Economic Development. Appropriate changes have been incorporated. The plan is currently at the Word Processing Center for final typing and the maps are being prepared at Graphic Arts.

3. Division Engineers have been designated as approval authority for these plans by ER 1130-2-400. Information Copies are to be forwarded to OCE upon approval.

Incl  
As stated

CF: Opers Div Files

  
ANDRELIUNAS

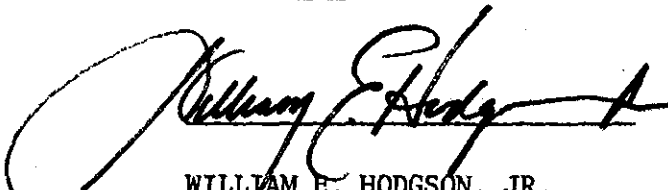
TO: Chief, Operations  
Division

FROM: Division Engineer

DATE: 5 January 81 CMT 2

☒ APPROVED

☐ DISAPPROVED

  
WILLIAM E. HODGSON, JR.  
Colonel, Corps of Engineers  
Acting Deputy Division Engineer

BLACKWATER FLOOD CONTROL RESERVOIR

Webster and Salisbury, New Hampshire

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Jointly Prepared By

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Feb '81

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## SECTION 1. INTRODUCTION

### Purpose

The purpose of this Master Plan Appendix is to present a comprehensive and coordinated management program for the forest fish and wildlife resources contained within the project boundaries of the Blackwater Flood Control Reservoir and to provide a framework with which to manage these resources. The importance of these resources as part of the ecosystem of the Merrimack River Basin necessitates the development of a plan to delineate management objectives, practices, and priorities which are compatible with other resource goals, directed toward both consumptive and non-consumptive utilization by the public, and attainable within the limitations of the land and its renewable resources.

### Authority

This combined forest and fish wildlife management plan, Appendices B and D to the project master plan is authorized under ER 1130-2-400, dated 28 May 1971.

### Management Objectives

The objectives of this management plan are to outline resource management practices which are compatible with flood control operations and multiple-use practices. Forest, fish and wildlife management, diversified recreational use of project natural resources and, where compatible and practicable, provisions of wood products for project and commercial use are all taken into consideration.

### Coordination

This plan has been developed as a joint effort by the U.S. Army Corps of Engineers and the New Hampshire Department of Resources and Economic Development, Division of Forests and Lands, with review by the New Hampshire Fish and Game Department.

## SECTION 2. PROJECT DESCRIPTION

### Location

Blackwater Dam, controlling a drainage area of 128 square miles, is located on the Blackwater River approximately 8.6 miles above its confluence with the Contoocook River. It is situated just north of the village of Swetts Mills, in the town of Webster, Merrimack County, New Hampshire, and is about 12.5 miles northwest of the city of Concord, New Hampshire.

### Acquisition

Authorization from the construction and operation of Blackwater Dam and Flood Control Reservoir comes from the Flood Control Acts of 22 June 1936 (Public Law 738, 74th Congress); and of 28 June 1938 (Public Law 761, 75th Congress). It is designed to operate as part of a flood protection system in conjunction with three flood control reservoirs in the Merrimack River Basin. There are Hopkinton-Everett Lakes on the Contoocook and Piscataquog Rivers, Edward MacDowell Dam on Nubanusit Brook, and Franklin Falls Dam on the Pemigewasset River.

Blackwater Dam and Flood Control Reservoir, comprising of approximately 3,605 acres, is owned by the United States Government. Reservoir management and operation functions are administered by the Department of the Army, New England Division, Corps of Engineers. Forest resources management has been implemented by the State of New Hampshire, Department of Resources and Economic Development, for the past twenty-five years through a wildlife, forestry and recreation license granted in 1954.

### Boundaries

The Blackwater Flood Control Reservoir has been surveyed and bearings have been established utilizing the New Hampshire Plane Coordinate System. Approximately twenty-eight miles of boundary have been located and permanently marked with blazes and blue paint. Two hundred twenty corners have been permanently established and can be identified by brass identification hubs imbedded in the top surface of concrete posts. Boundaries were first established by the State of New Hampshire, Department of Resources and Economic Development (known as New Hampshire Forestry and Recreation Commission) in 1955-56 and redone every ten years under a forestry, wildlife and recreation license agreement. Last reblazing and painting was done in 1977. See boundary map Section 11, page 41.

### Access

The Blackwater Dam and Flood Control Reservoir are readily accessible to all of the heavily populated northeast over a network of roads, state

highways and interstate highways. Interstate 93 passes six miles east of the reservoir area and Interstate 89 passes five miles to the south. Routes 9 and 202 are the principle east-west state highways bringing traffic to the area along with Route 3 and 4 the principle north-south state highways.

Immediate access to the vicinity of the dam and flood control reservoir is then accomplished by Route 127, a secondary macadem state highway, which connects with the four state highways mentioned above. Secondary local roads off of Route 127 then enter the reservoir area at various locations; Province Road, South Road, and Long Street, to mention a few. See access map Section 11, page 42.

### History

Construction of the Blackwater Dam was started in May 1940 and completed in November 1941. The dam was designed and constructed to provide flood protection to downstream areas along the Blackwater, Contoocook, and Merrimack Rivers.

In 1951, the State Forester requested that the then New Hampshire Forestry and Recreation Commissioner assume responsibilities for the management of the reservoir area in the areas of forest conservation, wildlife, recreation, forest insect and disease control, and forest fire protection. In July 1953, the New Hampshire Forestry and Recreation Commission was designated by the Governor of New Hampshire as the state agency to assume management responsibilities.

The New Hampshire Department of Resources and Economic Development holds a 25-year license for management of the recreation, fish and wildlife, and forestry resources of approximately 3,510 acres of reservoir land and water areas (98% of the reservoir acreage). Since issuance of the license, in November 1954, the forest management program has been involved in a variety of yearly activities:

1. Timber Sales
2. Road construction and maintenance
3. Fire control activities
4. Wildlife stocking activities
5. Boundary line maintenance
6. Timber cruising
7. Timber stand improvement work

Money derived from stumpage sales has been used to pay for a majority of the activities mentioned previously.

Operation of the Blackwater Dam and Flood Control Reservoir has resulted in socio-economic effects to the immediate area and adjacent lands as well as remote downstream regions. Flood protection provided by the dam helps insure the continued use of downstream areas by commercial, industrial, and private interests.

The reservoir area also provides great diversification of recreational facilities, aesthetics, and habitat for birds and mammals. Careful management by the New Hampshire Department of Resources and Economic Development, Division of Forests and Lands, on a multiple use basis has protected and preserved the natural resources of the reservoir area for use and enjoyment of both present and future generations.

### SECTION 3. PHYSICAL AND ECOLOGICAL CHARACTERISTICS

#### Climate

The overall climate of this region varies greatly from winter to summer and from day to night with a mean annual temperature of 45°F. The average monthly temperature varies from 70°F in July to about 20° in January. The mean annual precipitation is about 37 inches and is uniformly distributed throughout the year. The average snowfall, which usually occurs between November and April is about 68 inches. The growing season averages about 160 days.

#### Wind

Windfall potential for timber on Blackwater is generally low to moderate. The soil types, species composition, and general meteorological conditions produce mixed White Pine - Northern hardwood forest which is characteristically deep rooted. Shallow soil areas exist on steep slopes and in wet areas. Stands of hemlock and spruce that occur on the project, because they are shallow-rooted, are prone to windthrow.

Undercut banks, slump areas and flood-damaged trees exhibit the only serious windthrow potential on the project. Such danger areas will be noted by field personnel during the course of resource inventories. Preventive measures can be taken by project personnel or contracted labor.

#### Topography

The Blackwater River meanders through a valley bottom that is relatively flat (Elevation: 515 feet +). This condition extends for only a short distance from the banks of the river before gentle slopes take over and extend to the boundaries of the Blackwater Flood Control Reservoir (Elevation: 584 feet +). This topography is consistent throughout the entire reservoir area.

At spillway elevation (566 feet +), drainage area of the Flood Control Reservoir extends north along the Blackwater River for approximately seven miles and has the potential of a total capacity of 46,000 acre-feet, equivalent to 6.7 inches of runoff from a watershed surface of 3,140 acres. This drainage area is located along the northern boundary of the town of Webster and along the southern boundary of the town of Salisbury, both in Merrimack County, New Hampshire.

The Flood Control Reservoir is less than one-half mile wide for a distance of about one mile above the dam structure, widens to a maximum width of about two miles in its central portions, and then narrows again to a width of less than one-half mile in its upper two mile section.

The Blackwater River, deep and slow flowing with an average width of 100 feet, meanders approximately 14 miles through the drainage area with a generally uniform slope of 6 feet per mile. See topography map Section 11, page 43.

### Soils

All of the land area encompassed by the Blackwater Reservoir has been surveyed by the Soil Conservation Service. USDA soil maps and data sheet are available at the Soil Conservation Service County Extension Offices of Merrimack County.

### Associations

The major soil association within the reservoir area is the Hinkley-Windsor Au Gres. Of minor importance is the Ondawa Windsor - Agawam association, usually found at higher elevations away from the river. Soil associations are landscapes that have distinctive proportional patterns of soils, each consisting of one or more major soils and at least one minor soil. The soil in one association may occur in another, but in different portions. The following description is taken from the text of the Merrimack County Soil Series 1961, No. 22. A complete list of soils series found at Blackwater is found in Section 10, page 2.

#### Hinkley - Windsor - au Gres

Sandy and gravelly soils of plains, mounds, ridges, and depressions.

This association occurs in nearly level sandy and gravelly plains, sloping terraces, small gravelly mounds, and low gravelly ridges. The Hinkley, Windsor Au Gres are the main soils in this association. The Hinkley soils are excessively drained, gravelly, and loose. They occupy 45 percent of the association. Windsor soils are excessively drained and sandy but they have little or no gravel.

Adjacent to the droughty Hinkley and Windsor soils are the wet sandy Au Gres soils. These soils occupy depressions and gently sloping terraces. They are kept wet by a high, fluctuating water table. Included with the soils of this association are minor areas of Sudbury and Scarboro soils.

This association is low in agricultural value. Farms usually are partly on it and partly on better agricultural soils. The drier parts of this association are ideal for urban expansion. Many sandpits are in this general area.

### Development of Available Data

A variety of parameters and specifications are utilized by the Soil Conservation Service to present a guide for assessing the best uses for

each soil type. A file of current, relevant survey sheets is located at the Merrimack River Basin Area Office along with one copy of the Merrimack County Soil Survey.

Soil Map mosaics have been pieced together for the reservoir lands. Mylar overlays which could be used with a standard base map should be produced to indicate soil areas suitable for wildlife habitat, agricultural leases and forest type planning. Such characteristics as soil depth, pH, relative water percolation, index plant species, slope and water table depth must be considered along with land use needs to produce specific recommendations for Blackwater Dam.

The relative accuracy of the Soil Conservation Service data is excellent and will be considered adequate for this basin's planning program. Soil maps are accurate to 2+ acres. Questions on management unit boundaries should be resolved by field inspections. Soil testing apparatus will be supplied at the basin level to assist field personnel in monitoring soil conditions and recommending soil conservation methods for specific land units, i.e., liming, fertilization, plant species for reforestation, etc. Certain local conditions can modify soils enough to warrant soil testing for a specific purpose or on a periodic basis. This is especially important with soils subject to varying periods of inundation resulting from reservoir operations. Eventually, accurate guidelines for fertilizer application and soil productivity practices can be developed.

The following are basic facts about the local soils:

1. They are moderately to highly acidic.
2. Most of the soils are sandy, with rapid water permeability, or poorly drained silty sand.
3. A portion of the project is classified as man-made soil because of construction activities, and as such is not classified by Soil Conservation Service in a land use category.
4. The predominant soil association is characterized by loose structure, moderate erosion potential, and mild slopes with intermittent steep slopes and depressions.
5. Natural regeneration of white pines and northern hardwoods is favorable on all soils in the project, with possible exceptions on the man-made soils.

The light, sandy texture of the local soils leads to an acidic, highly-leached substrate.

The soils are formed in the river valley from quartzite and mica schist minerals from the White Mountains, which were washed down after the last so-called Ice Age. The depth of the water table varies from 0-5 feet along the valley floor. In contrast to the outwash and alluvial soils found close to the river, the upland areas have deep sandy, very stony soils such as the Gloucester series. Most of the soils are considered

immature, having very little horizon development. All typically have a thin B level, although many of the non-stony soils have been modified by past plowing. A lack of water-retaining organic material near the surface leads to drought in the excessively-drained areas.

#### Cultivated Fields and Pastures

Approximately 225.1 acres are presently leased for agricultural purposes. Other fields are available for outgrant. Because agricultural use arrests plant succession, it helps maintain a variety of interspersed habitats for wildlife. Granting leases for cultivation and pasture is one of the most economical methods of maintaining and improving these critical areas. Buffer zones of native grasses and shrubs should be maintained between cultivated fields and the river to prevent excess run-off of nutrients and topsoil.

#### Water Influence Zones

Consideration for the flood control mission of the project must be included in all resource inventory and management projects. The effects of operation on timber harvest debris, bank erosion, road and trail maintenance, and wildlife habitat need to be assessed by field observations and data interpretation.

Areas prone to annual flooding should be noted in addition to the 50 and 100 year levels. Such areas may be intensively managed to remove slump-prone vegetation and maintain a grass cover to hold the soil and minimize the amount of debris which is carried downstream by receding flood waters.

#### Marsh Lands

The project contains a considerable amount of marsh habitat, much of which is the result of beaver activities on tributaries and the main river. Specific acreages and locations of marsh habitat, as well as potential sites for subimpoundments should be determined by inventory.

#### Water Quality

The water quality of the Blackwater River and tributary brooks is designated as Class B. Class B waters, according to State Water Quality Standards, shall have no objectionable physical characteristics, shall be near saturation for dissolved oxygen (not less than 75%) and shall be no disposal of sewage or waste into Class B waters without adequate treatment. The pH range shall be 6.5 to 8.0, except when due to natural causes.



## Timber

The Blackwater Flood Control Project is located in a transitional zone of forest types. To delineate the forest cover types found at the Blackwater project, cover maps were prepared from data collected during a systematic cruise of the reservoir. The guidelines for the determination of each cover type were taken from Forest Cover Types of North America, published by the Society of American Foresters.

Extensive land clearing by white settlers followed by massive shifts in population after the Civil War have resulted in second and third growth forests consisting predominantly of the cover type White Pine (Pinus strobus). White Pine is frequently the first type to occupy agricultural land after abandonment or timber cuttings, and is found in all compartments and stands. Associated species are numerous; the principle ones are: Northern Red Oak (Quercus rubra) and Red Maple (Acer rubrum).

The second most frequent type is Eastern Hemlock (Tsuga canadensis) with associated species Red Oak, Red Maple, and White Pine

The last major forest type is Red Oak with associated species being White Pine and Red Maple.

Excluding pure stands of Red Alder (Alnus rubra) seven additional forest cover types have been identified. Most are variations of the predominant types resulting from varying percentages of the associated species. The relative abundance of associated species varies depending on crown closure, soil moisture content, slope and aspect, historical land use and relative factors.

Other species present in most of the forest types are: Gray Birch (Betula populifolia), Quaking Aspen (Populus tremuloides), Basswood (Tilia americana), Butternut (Juglans cinerea), Black Cherry (Prunus serotina), Yellow Birch (Betula alleghaniensis), Paper Birch (Betula papyrifera) and Sugar Maple (Acer saccharum). In general, most of the land of Blackwater Dam and Reservoir is in forest cover of White Pine, Red Oak, and Hemlock types.

## Wildlife

The Blackwater River, classified as the best trout stream in the southern portion of the state, is stocked annually by the New Hampshire Fish and Game Department with brook, brown and rainbow trout. There is high fishing pressure on the river with an estimated 50% return on released fish.

The Flood Control Reservoir is considered very good habitat for such species as whitetail deer, ruffed grouse, woodcock, snowshoe hare, grey squirrel and pheasant. Occasionally, a bear is found in the area. Waterfowl do breed in the reservoir area. Black duck, wood duck, hooded

merganser, and some mallard are the main species present. In general, there is moderate to heavy hunting pressure for all species.

Fur-bearing species in the vicinity include beaver, mink, otter, fisher, muskrat, raccoon, and red fox. Trapping in the reservoir area is primarily for beaver, mink, and muskrat.

## SECTION 4. RESOURCES MANAGEMENT

### Management Policy Statement

Management of the Blackwater Flood Control Reservoir resources on a multiple use basis will provide the greatest benefits to the largest number of persons possible. (Environmental Assessment, 1973)

The multiple use concept involves a combination of uses of the land in such a way that full utilization is realized consistent with managerial goals and objectives. This presupposes that several uses will be combined in such a manner so that they are complementary and also attainable.

In adopting multiple use to an area, such as the Blackwater Flood Control Reservoir, it involves two major steps before it can be properly applied to the land. The first step requires a statement of goals for the protection, development and utilization of each resource. The second step involves the defining of the land management objectives in order to meet or make the goals attainable.

Once objectives of land management are defined, the techniques of using individual resources in a manner complementary to each other come into play. If all resources can be used to a maximum without conflicts, the ultimate is obtained. However, such full use isn't usually attainable. When uses are competitive they just don't fit together easily.

Conflicts between uses may arise, such as between management of the forest for recreation and timber production, between wildlife management and timber production, and between recreation and wildlife management. These are only a few examples which can be multiplied many times with each combination of resources presenting its own particular problems and solutions.

In applying multiple use to the Blackwater Flood Control Reservoir, careful planning of all resource uses must be carried out in such a way that overall goals and objectives are attained. These goals and objectives are best fulfilled by assuring that the contribution from any combination of resource uses is greater than from any single use.

Management of the Blackwater Flood Control Reservoir will be consistent with the goals and objectives as expressed in the Master Plan and will be coordinated with other state resource agencies.

### Area Definition

Natural resources cannot be narrowly defined or limited by area boundaries. Every part of a forest has aesthetic values. Water resources can

be affected by activities anywhere between the stream and the ridge top. The food source or cover for some species of wildlife will be affected for better or worse by timber cutting anywhere on the forest.

However, we can define key areas which are vital to the development, preservation or utilization of a given resource. The following resource areas will be recognized in inventory and management work on the Flood Control Areas. In each resource area the title use will be the dominant use, but other uses may be permitted under situations and limitations which will not impair the area for its dominant use.

#### Scenic Areas

Scenic areas are those in which aesthetic considerations come first. These areas are primarily adjacent to public travel routes such as roads, trails, and navigable streams. Mountain tops and upper slopes are also included in because they are visible from greater distances.

#### Water Resource Areas

Water resource areas consist of strips along the shores of streams, ponds, and marshes which vary in width with the size of the water body and the slope and soil type on the area.

#### Natural Reserve Areas

Natural reserve areas are those which contain (a) unique geological features and/or (b) unique plant communities which will not change their composition in a relatively short time in the natural course of plant succession.

#### Wildlife Areas

Wildlife areas are those which include key sources of wildlife food and cover. This will include water areas for waterfowl and aquatic animals.

#### Historical Areas

Historical areas are those which contain man-made features such as old building sites, cemeteries, mines, and roads of archeological or historical interest.

#### Recreation Areas

Recreation areas are those in a forest area that have some identified recreation use passive in nature such as a trail of any type, primitive campsites where allowed, identified natural springs in use and areas known to be heavily used by the public for recreation purposes.

## Timber Management Areas

Timber management areas will consist of all lands not included in the above categories.

## Area Management Policies

### Scenic Areas

These areas will be managed for the preservation and improvement of their aesthetic qualities. In most instances, the roadside and trailside strips will be left undisturbed. However, limited timber cutting which will improve the aesthetic qualities will be permitted, for example: (a) removal of dead or diseased trees, (b) single tree or group selection cutting which will give variety to the scene by creating irregular margins and giving more variety in plant size and species, and (c) small clear cuts to open vistas.

### Water Resources Areas

These areas will be managed to preserve and/or improve water quality by (a) providing shade to keep water temperatures low, (b) protecting stream banks from erosion, (c) providing a buffer zone for retention of soil sediments which might otherwise enter the stream, and (d) providing unobstructed access to waterbodies for fishermen and hikers.

### Natural Reserve Areas

The only projects permitted in these areas will be construction of basic access facilities such as trails, foot bridges, and signs.

### Wildlife Areas

Management practices in wildlife areas will be designed to maintain or establish preferred food and/or cover plants. This objective may be accomplished by (a) modification of timber sale marking practices such as favoring mast and den trees, (b) dispersal of sale areas and adjustment of sale schedules to provide the desired resources at the optimum place and time, and (c) non-commercial projects specifically designed to improve wildlife habitat. The management objective in these areas will be the maintenance of a variety of wildlife at optimum levels of population.

Access to state forests for hunting and fishing will not be restricted except in times of unusual fire danger.

### Historical Areas

These areas will be managed to preserve the historical features. Basic access will be provided as in the natural areas. Clearing may be required to prevent deterioration of the site. Signs identifying the features may be erected.

## Recreation Areas

All forest practices will be tailored to protect or enhance the identified recreation use. Trails will be left unobstructed and special care will be taken in regard to slash within sight of the trail. (See scenic areas)

Primitive campsites and springs will be protected from cutting except for dead trees or hazard trees.

Management practices on areas of known heavy public use will require greater emphasis on slash treatment. Aesthetic considerations will be accentuated in these areas.

## Timber Management Areas

Timber management areas will be managed for a sustained yield of timber products. Silvicultural practices applicable to a given stand will be used, but the system will be modified if its application will result in serious impairment of other resources. Marking practices will favor mixed stands. Slash logging will be required on timber sales in order to reduce fire hazard and improve scenic quality. Logging operations will be conducted in a manner which will protect all resources. Areas with steep slopes and then soils not suited to a sustained yield of timber crops will be restricted to the better sites. Approved biodegradable herbicides may be used in target type application to selected stems in the timber management areas.

## Management Goals, Situation and Objectives

### Wildlife

Goal: To maintain and improve the habitat for all species of furred, feathered, and finned wildlife on the Blackwater Flood Control Reservoir.

#### Situation:

- A. The Blackwater River is stocked annually by the New Hampshire Fish and Game Department with brook, brown, and rainbow trout. There is high fishing pressure on the river with an estimated 50% return on released fish.
- B. Reservoir area is considered very good habitat for such species as whitetail deer, ruffed grouse, woodcock, snowshoe hare, grey squirrel and pheasant. Occasionally, a bear is found in the area.
- C. Waterfowl do breed in the reservoir area. Black duck, wood duck, hooded merganser, and some mallard are the main species. In general, there is moderate to heavy hunting pressure for all species.

- D. Fur bearing species in the vicinity include beaver, mink, otter, fisher, muskrat, raccoon, and red fox. Trapping in the reservoir area is primarily for beaver, mink, and muskrat.
- E. Periodic flooding causes some mortality to certain fur bearing species and upland birds and mammals during the breeding season.
- F. There are approximately 500 acres of open land within the reservoir area. Substantial proportions of all forest wildlife are "edge dwellers", who benefit from the existence of an edge between forest and nonforest.
- G. Wildlife management involves a great deal of cost, but makes no monetary return to forest management.

Degree of Physical Compatibility of Secondary with Primary Forest Uses

Primary Use	Aesthetics	Recreation	Wildlife	Soil & Water	Timber
Aesthetics		Moderate; may limit intensity of use	Compatible to most wildlife	Fully compatible	Limited compatibility affects amount of harvest
Recreation	Moderate unless use is excessive		Highly compatible	Fully compatible	Limited compatibility; Timing and intensity
Wildlife	General compatibility	Limited compatibility; use intensity must be limited		Generally fully compatible	General compatibility; may limit volume or condition of harvest
Soil and Water	Fully compatible	Moderate compatibility; may limit intensity	General compatibility		Moderate compatibility; restricts harvest methods does not prevent timber harvest
Timber	Compatible if harvest methods strictly controlled	Moderate compatibility	Compatible if harvest methods fully controlled	Compatible if harvest methods fully controlled	



## Objectives:

- A. Coordinate a wildlife management program with the New Hampshire Fish and Game Department. This could be accomplished through manipulation of vegetative cover so as to improve food, cover, and nesting sites for protecting and favoring the growth of certain wildlife populations.
- B. Determine with the cooperation of the New Hampshire Fish and Game Department if and where rare and endangered species are located within the reservoir, so as to maintain special habitat requirements for them.
- C. Care to be taken when organizing forest activities in the vicinity of a well defined and heavily used wildlife habitat.
  - 1. Certain recreational activities, such as cross country skiing, will be established away from deer wintering yards.
  - 2. Silvicultural treatments will take into consideration kinds of wildlife to be affected.
  - 3. Timber harvesting will utilize individual areas of between 50 and 100 acres wherever possible.
  - 4. Timber harvesting will be conducted in such a way as to produce the largest and most variable amount of edge effect possible.
  - 5. Timber harvesting operations are to be conducted so as to maintain existing water temperature (streamside or rivers cutting) and water quality (erosion control).
- D. Wildlife considerations must be more deeply ingrained into the planning and the management of the forest.

## Recreation

### Goal:

To provide and maintain somewhat passive program of recreational opportunities for local residents and visitors to the Blackwater Flood Control Reservoir.

### Situation:

- A. A Corps-managed picnic area is located in the vicinity of the dam.

This area consists of six picnic tables, six fireplaces, two pit toilets, and a parking area. There is no drinking water available at the picnic area.

- B. No other developed recreational areas are present within the reservoir area.
- C. There are approximately 20 - 25 miles of trails that are marked and maintained within the reservoir area. These trails can be utilized for hiking, cross country skiing, and snowmobiling.
- D. There are five river access points along the Blackwater River used primarily for small boats and canoes:
  - 1. Princes Mills
  - 2. Center Road
  - 3. South Road
  - 4. Province Road
  - 5. Newbury Road Extension

Objectives:

- A. Maintenance of trails by utilizing available temporary labor.
- B. Improvement of river access point along the Blackwater River for boats and canoes to facilitate better access and parking.
- C. Removal of debris from river to provide continuous flow for boats and canoes with use of available temporary labor.

Fire Protection

Goal:

To prevent and control man-caused and naturally caused wildfires in the Blackwater Flood Control Reservoir where a variety of very valuable natural resources would be damaged or destroyed.

Situation:

- A. Fire protection is a first requirement in establishing a good multiple use forest program.
- B. Intensive forest management cannot be practiced unless there is reasonable assurance that plans will not be disrupted by fire.

- C. High potential for fire exists within the reservoir area.
  - 1. Softwoods make up a majority of the timber types located in the reservoir area.
  - 2. Periodic flooding produces many dead trees of high fire hazard.
  - 3. Accessibility to the area has a negative point in allowing for more man caused fires.

Objectives:

- A. Coordinate a program of prevention, preparedness, and suppression with the New Hampshire State Forest Fire Service.
- B. Restriction of forest activities during period of high fire danger.
- C. Maintenance of road and rail access to reservoir area for the purpose of supplying accessibility for fire fighting equipment. Accessibility has positive point for the purpose.

Soil and Water

Goal:

To maintain and improve a continuous flow of high quality water and to conserve the soil in the Blackwater Flood Control Reservoir

Situation:

- A. Principal uses of the water in the reservoir area are for a few recreational activities which include: canoeing, fishing, and waterfowl hunting
- B. There is an ever-present possibility of bank erosion and mortality to trees if flooding and backup water occurs within the reservoir area.

Objectives:

- A. Consult with the Agricultural Stabilization and Conservation Service (ASCS) pertaining to forest activities that might effect the quality and quantity of water flow or damage the soil resources.

- B. Coordinate a program with the ASCS, SCS, and the Corps of Engineers to monitor the effect of various forest activities on the quality and quantity of water flow and damage to the soil resource on a yearly basis.
- C. In order to conserve soil and water supplies, there must be some development of constraints on incompatible forest activities.
  - 1. Careful planning of all future road systems within the reservoir area.
  - 2. Maximum grades of 10% on any road.
  - 3. Protective strips of absorbent, undisturbed forest soil between any roads and streams or rivers. Minimum distance of 100 feet is recommended between roads and streams of river.
  - 4. Placement of culverts and/or waterbars along roads to control water flow.
  - 5. Bridge construction whenever stream crossing is essential.
  - 6. Continuous maintenance program to control road erosion and to provide access to forest stands.
  - 7. Regulation of traffic on certain roads during unfavorable road or weather conditions.

## Roads

### Goal:

To maintain and improve access to the Blackwater Flood Control Reservoir for the purpose of developing, protecting, and utilizing the natural resources that are available.

### Situation:

- A. There are two bridges that cross the Blackwater River within the reservoir area.
  - 1. Peter's Bridge
  - 2. South Road Bridge
- B. There are four types of roads that have been developed within the reservoir area.

1. Class A - Paved - All purpose

a. Newbury Road	2000 feet
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2. Class B - Gravel - All purpose

a. South Road	13,055 feet
b. Mill Road	16,100 feet
c. Little Hill Road	6,990 feet
d. Couchtown Road	<u>2,100 feet</u>
	40,245 feet

3. Class C - Gravel - Restricted use - Light duty vehicles

a. Center Road	4,450 feet
b. Glines Road	8,700 feet
c. Plains Road	6,800 feet
d. Cogswells Woods Road	3,500 feet
e. Newbury Road Ext.	3,500 feet
f. Province Road East	2,000 feet
g. Province Road West	1,500 feet
h. Chairfactory Road	<u>13,000 feet</u>
	43,450 feet

4. Class D-Non Gravel-Restricted use 4-wheel drive vehicles

a. Heath Highway	950 feet
b. Long Street	<u>7,000 feet</u>

Objectives:

- A. All Class C and D roads will be maintained by the licensee in the same or better condition than they are at the present time.
- B. All skid roads and truck roads established for the purpose of removing timber products will be maintained as Class D.
- C. Culverts and waterbars will be utilized to prevent erosion on all Class C and D roads.
- D. Maintenance of all roads will be done on a contract basis and/or with available temporary labor.

## Refuse

### Goal:

To provide and maintain a refuse removal program for the Blackwater Flood Control Reservoir so as to preserve, protect, and improve its attractive and healthful environment.

### Situation:

- A. Refuse barrels located at five locations within the reservoir area:

Peter's Bridge  
South Road  
Dam Picnic Area

Little Hill Dike  
Newbury Road Extension

- B. Local resident hired for approximately six months to empty refuse barrels and transport refuse to local sanitary landfill.

### Objectives:

- A. Add an additional refuse barrel in the vicinity of the Province Road and Chairfactory Road intersection.
- B. Continued use of local resident hired for approximately six months to empty refuse barrels and transport refuse to local sanitary landfill.
1. Require one day a week for the months May and June
  2. Require two days a week for the months July and August
  3. Require one day a week for the months September and October
  4. Minimum wage per hour plus the going rate per mile for vehicle
- C. Use of any temporary labor that is available to supplement weekly refuse removal.
- D. Use of any temporary labor that is available to remove refuse from roadsides within the reservoir area.

## Amenities

### Goals:

To preserve, protect, and improve conditions within the Blackwater Flood Control Reservoir, which possesses remarkable scenic, recreational, geologic, historic, cultural or similar values, so that present and future generations can enjoy the benefits.

### Situation:

- A. Increasing pressures are developing from the non-forest land owning public for aesthetic enjoyment of the public forests.
- B. Increasing concern pertaining to the relationship between commercial timber production and the other multiple-use values including forest aesthetics.

### Objectives:

- A. Enhancing aesthetic qualities of the landscape by developing vistas and emphasizing desirable topographic features of the area by either creating or utilizing existing openings in the forest.
- B. Protecting woodlands from uncontrolled fires by developing a good fire program with the assistance of the New Hampshire State Forest Fire Service.
- C. Performing light harvest cutting operations (25%-35% of existing volumes) which leave the forest intact, but improves its quality.
- D. Utilization of all material possible from harvesting operations.
  - 1. Utilization to minimum top diameter of 4 inches.
  - 2. Utilization of all hardwood in a firewood program.
- E. Protecting the uncut trees, seedlings and other reproduction by careful felling, skidding, and hauling practices.
- F. Protecting the site against erosion by proper extractive methods including well planned skid and haul road layout, adequate water drainage facilities, and restriction on vehicles to be utilized.

- G. Cutting logging slash and severely damaged trees to lie close to the ground after harvesting operations. Adhering to State laws on harvesting will cover this.

#### Law Enforcement

##### Goal

To provide and maintain active law enforcement program within the Blackwater Flood Control Reservoir so as to protect the natural resources as well as local residents and visitors to the area.

##### Situation:

- A. Reservoir area is open during daylight hours only, but nighttime activities, which are illegal, are present.
  - 1. The area along the Newbury Road Extension is one of major concern to local residents.
  - 2. Littering is somewhat of a problem throughout most of the reservoir area.
- B. Illegal cutting of trees has become a problem in recent years.
- C. Illegal disposing of housing refuse is increasing.

##### Objective:

- A. Coordinating a program for law enforcement coverage of the Blackwater Flood Control Reservoir with the Bureau of Off-Highway Vehicles, Department of Safety, and local law enforcement officials.
- B. Reestablish gates across the entrances of access roads as needed into the reservoir area. This will provide access for management and fire protection purposes, but will eliminate unauthorized vehicle use by the general public.

#### Timber

##### Goal:

To provide a sustained yield flow of forest products from the Blackwater Flood Control Reservoir, for economic and social purposes, consistent with maintenance of environmental and quality harvesting standards.



Situation:

- A. A large volume of sawtimber material is available to be harvested. See Merchantable Timber Volume Summary Section 11, page 11-11.
  - 1. Approximately five million board feet of marketable hardwood sawtimber is present.
  - 2. Approximately nineteen million board feet of marketable softwood sawtimber is present.
- B. The allowable cut of marketable forest products has not been accurately determined.
  - 1. Growth figures of forest stands are not available.
  - 2. An accurate measurement of natural mortality has not been made.
- C. Flooding during the growing season is potentially harmful to forest stands immediately adjacent to the Blackwater River.
- D. Boundary lines were blazed and painted in 1977 and 1978.
- E. A forest inventory was conducted in 1977.
  - 1. Species composition (overstory, understory, and reproduction)
  - 2. Volumes of merchantable material
  - 3. Density and distribution of vegetation
  - 4. Site conditions
  - 5. Recommendations for treatment of individual forest stands
- F. A very adequate road system throughout the reservoir area is conducive for the removal of forest products
- G. Large acreage of forest land is in need of some type of silvicultural treatment. See Silvicultural Treatment Summary Section 11, page 11-12.
  - 1. Approximately 300 acres have medium priority for some type of timber stand improvement.

2. Approximately 209 acres have high priority for some type of timber stand improvement.
3. Approximately 1307 acres have medium priority for some type of commercial harvesting operation.
4. Approximately 535 acres have high priority for some type of commercial harvesting operation.

Objectives:

- A. Determination of allowable cut for marketable forest products.
  1. Establishment of growth plots throughout the reservoir area to determine annual increment.
  2. Utilize growth plots to sample amount of natural mortality within forest stands.
  3. Coordinate annual growth determination, mortality, and sawtimber volume presently available to assess forest conditions for proper sustained yield decisions.
- B. Forest stands immediately adjacent to the Blackwater River will require special attention.
  1. Establishment of reproduction will have to be through natural regeneration because of the potential of loss from flooding.
  2. Harvesting operations will be conducted so as to prevent debris and siltation from polluting the river.
  3. Use of chemicals will be restricted or prohibited.
  4. Mature sawtimber will be removed on an earlier schedule than normal to prevent mature and over-mature trees from being lost to flooding.
  5. Sanitation cuttings in younger forest stands will be conducted on a more frequent schedule than those of upland forest stands.
    - a. Prevent debris from entering river.
    - b. Create an aesthetically pleasing environment.
- C. Forest stands with high priorities for silvicultural treatments will be scheduled ahead of those with medium priorities.

- D. Forest inventory to be conducted every ten to fifteen years.
- E. Boundary lines to be blazed and painted every ten years or sooner depending on need for maintenance.
- F. Road system throughout the reservoir area will be maintained at the same or better level than it exists at the present time.
  - 1. Approximately one mile of road should require immediate attention each year.
  - 2. Revenue from commercial harvesting operations will be utilized to finance all forest activities.
- G. Revenue from yearly commercial harvesting operations will be utilized to finance all forest activities.
  - 1. Road maintenance
  - 2. Timber stand improvement work
  - 3. Forest inventories
  - 4. Boundary line maintenance
  - 5. Forest fire protection
- H. All silvicultural treatments conducted within the flood control reservoir will be coordinated with all other forest uses so as to provide the greatest number of benefits to the largest number of persons possible.
- I. There will be no significant changes in our forest management planning process because of the potential of flooding. The overall effect of flooding to the forest resources has been negligible in the past. (Environmental Assessment, 1973)

## SECTION 5. FOREST MANAGEMENT

### Existing Management

#### Introduction

The State of New Hampshire had been contributing forest protection services to the Corps of Engineers in the Blackwater Flood Control Area, most notably forest fire protection and blister rust control, prior to 1951, then State Forester William Messeck, Jr. requested that the State assume forest management responsibility of the area.

In July, 1953, Governor Hugh Gregg designated the New Hampshire Forestry and Recreation Commission as the State agency to assume management responsibility pending U.S. Army Corps of Engineers' concurrence.

On November 4, 1954, a license was issued by the U.S. Army Corps of Engineers to the State of New Hampshire Forestry and Recreation Commission for recreation, fish and wildlife, forestry, and other management uses for a 25-year period expiring in November, 1979. A forest resource management program was immediately initiated within the limitation of available personnel and funds.

The Blackwater Flood Control Area management license prompted enactment of RSA 219:26 by the New Hampshire Legislature in 1961, designating the New Hampshire Forestry and Recreation Commission as the management agency of federal forest land in New Hampshire in accordance with proper agreement with the federal government pursuant to the so-called Fulmer Act (H.R. 6914). In 1961, a management license at the Franklin Falls Flood Control Area was issued to the New Hampshire Forestry and Recreation Commission similar to the Blackwater license. The New Hampshire Forestry and Recreation Commission, prior to 1962, now the Department of Resources and Economic Development, carried out a systematic management program of forest improvement, protection, and maintenance operations on the Flood Control Area with the cooperation of other State agencies. Management activities included road construction and maintenance, forest protection, timber harvests and other forest improvement, timber stand improvement work, boundary line location and maintenance, wildlife habitat projects, wildlife surveys and stockings, and river access construction and improvement. Trash deposited by the public was also routinely collected.

A summary table in the appendix of this report provides details on accomplishments during the period 1954-1979. Following are some of the highlights.

#### Fiscal History

All management activities were financed by income derived from timber sales on the Flood Control Area. No supplemental funds were available

from any other source, either from the State or Federal Government. Over the past 25 years, total expenditures for management activities were \$118,820.68. Total timber sale revenue was \$120,735.16 leaving a current balance of \$1,914.48 of unexpended funds on the expiration date of the license, November 4, 1979.

A flurry of forest improvements necessary during the first biennium of the license, 1955-56, cost the New Hampshire Forestry and Recreation Commission \$17,955.36 and set the stage for a succession of annual forest management activities, the total cost of which was not fully reimbursed to the State of New Hampshire from timber sale revenue until 1960. Every year thereafter, operational costs to the State were fully reimbursed from timber sale revenue. The rate of harvest cutting was consistent with early estimates of timber volume and was limited to a harvest volume sufficient to produce revenue to maintain a consistent level of forest management activities indefinitely. For the 25-year period, average timber sale revenue was \$4,829.00 per year. Operational costs averaged \$4,753.00 per year. There were only three years timber sale revenue was not generated, 1962, 1972, and 1973. Revenue ranged from a low of \$13 in 1966 to a high of \$21,279.50 in 1959.

Except for the early years of 1955 through 1961 when priority was given establishment of a forest management program, annual operating costs were low from year to year. However, there was a notable increase in relative operating costs during the later years, primarily due to inflation. However, substantial increases in timber values allowed sufficient increases in revenue to cover the costs of maintaining a consistent level of management activities despite rising costs.

#### Timber Utilization

Early estimates of existing timber volumes in the Blackwater Flood Control Area by Corps of Engineers and State forestry personnel showed little promise for long-range potential without application of a forest management program. Prior to signing of the management license in 1954, no forest management activities had ever been carried out in the Flood Control Area.

During the first year of the license in 1955, over 1000 acres were cruised and a forestry action program was implemented. Harvest improvement cuttings were scheduled mainly in larger areas of old-growth White Pine and Hemlock to salvage poor quality, high risk trees, upgrade stand qualities, and provide early financial return. Usually these cuttings were followed by timber stand improvement work in conjunction with the timber sale or immediately after, removing cull hardwoods in favor of younger White Pine and mixed hardwoods. Where possible, these cull hardwoods were sold for firewood or charcoal. The first cutting operation in 1955-56 yielded a substantial volume of sawlogs (285 M board feet), pulpwood (238 cords), and piling (11,660 feet) from the Greenough Pond area. The use of State-hired logging crews vs. independent contractors,

in the Flood Control Area started with this sale and continued through 1966 when a change in fiscal procedure and State liability precluded their use.

State-hired logging crews allowed for greater utilization of low-value products such as softwood pulpwood and low-grade hardwoods. Timber was put roadside by these crews giving buyers easier access to timber products which encouraged sales during periods of low demand.

A decline for low-quality timber products started in 1958 resulting in lesser production of softwood pulpwood and a stoppage of hardwood sales. This decline continued until 1968 when the pulpwood market disappeared entirely making further commercial stand improvements difficult except for the sale of sawlogs.

For a short period after 1958, a small demand for chemically-peeled hardwood pulp-wood existed. Poor quality hardwoods were quickly treated on the stump by chemical debarking and put roadside by State-hired crews to take advantage of this brief market.

Timber yields were fairly consistent each year 1961 until the Franklin Falls Flood Control Area was put under the same type of license as Blackwater. After 1961, State-hired logging crews alternated between these two areas until 1966. After 1966, harvesting operations fluctuated from year to year to take advantage of the best stumpage markets.

By 1966, all large areas of poor quality, old growth White Pine and Hemlock had been salvaged at Blackwater, and subsequent cuttings were limited to small sale areas. The effect of which required more administrative time to work with smaller, less productive areas.

During the past 25 years over 217 MM board feet of sawlogs and over 1,200 cords of pulpwood were cut from harvest improvement operations from 509 acres. This represents about 28% of the commercial forest base of + 1800 acres in the Flood Control Area. The total forest land is + 2,919 acres. This averages 133.6 M board feet equivalent harvested per year on 20.5 acres, or an average 6,517 equivalent board feet cut to the acre.

Volume of wood grown for the future depends on the quantity and condition of growing stock maintained. At Blackwater careful distinction was made between trees left for production of future wood and surplus trees regarded as product and harvested. Cutting not only controlled composition and form of forest stands, but also the relationship between trees reserved for growth and the amount of growth available for cutting.

#### Forest Inventory

During the summer months of 1977, a forest inventory cruise of the Blackwater Dam and Reservoir was conducted as a joint effort between the U.S. Army Corps of Engineers and the State of New Hampshire Department of Resources and Economic Development.

The project was divided into compartments and then subdivided into workable units called stands. Data was collected on cruise cards which record: tract, compartment, timber type, slope, exposure, bottom, quality, stocking, insect damage, overstory species, size class, exposure, soil, timber quality, disease, understory species, point number, species, DBH, cruiser, and date.

From the data cards, merchantable timber volume in board feet for both hardwood and softwood as well as average volume of board feet per acres was derived. Other computations included average DBH, average log height, percent of stand, estimated board foot volume per acre and estimated stand board foot volume for each species in each stand for each compartment. Data sheets and field notes are on file at the Merrimack River Basin Office.

Reproduction is generally good with major species being White Pine, Northern Red Oak, Red Maple, and Eastern Hemlock. Ground cover consists of forest litter with various mosses and ferns forming the herbaceous component. An adequate duff layer (average depth varies from 0 - 3 inches) is present in most locations to retain moisture and protect the mineral soil.

#### Forest Compartments

The entire Blackwater project is divided into eight compartments. The parameters used to determine the boundaries are ease of access, ecological types, geographic features, and Corps boundaries.

Compartment one consists of 274.4 acres. The boundaries are the Blackwater Dam site in the south to Province Road in the north and the Corps boundary in the east to the east shore of the Blackwater in the west. The terrain has a generally mild slope.

Compartment two consists of 905 acres. The compartment's boundaries are Province Road in the south Road in the north with the Corps boundary in the east to the east shore of the Blackwater River in the west. This area is 30% marsh.

Compartment three consists of 152 acres of which 30% is composed of marsh and Greenough's Pond. The area is bounded by South Road in the south, follows the Corps boundary north, and circles back to South Road.

Compartment four consists of 324.2 acres with the boundaries being South Road to the south, Center Road to the north, with the Corps boundary to the east, and the eastern shore of Blackwater River to the west. This compartment has a mild slope.

Compartment five consists of 289 acres and is bordered in the south by Center Road and includes all Corps land to the north. This area is generally level with marsh areas along the Black River. Some open land is included and is leased for agricultural purposes.

Compartment six consists of 279.5 acres with the boundaries being Center Road to the north, South Road to the south, with the Corps boundary in the west and the east shore of Blackwater River in the east. This compartment is generally level with marsh along the river. Some open land is leased for agricultural purposes.

Compartment seven consists of 444.2 acres with the boundaries being South Road in the north to Province Road in the south with the Corps boundary in the west to the west shore of the Blackwater River in the east. This compartment has gentle to moderate slope and contains some marsh and an old sand pit which is no longer in use.

Compartment eight consists of 249.5 acres with boundaries being Province Road in the north to the Blackwater Dam site in the south and the Corps boundary in the west to the west shore of Blackwater River in the east. This compartment has a gentle to moderate slope. See compartment maps Section 11, pages 33 - 40.

#### Forest Resources

The 1977 inventory shows that Division of Forests and Lands timber harvests and other forest improvement operations over the past 25 years have substantially contributed to the maintenance and increased quality timber growth at the Blackwater Flood Control Area.

#### LAND USE BASED ON 1977 INVENTORY

	<u>AREA</u>	<u>TIMBER STOCKING</u>
TOTAL LAND	3535 acres	
TOTAL FOREST	2919 acres	24 MM bd. ft.
COMMERCIAL FOREST	1800 acres	15 MM bd. ft.

Total forest area is +2919 acres with a total stocking of 24 MM board feet of sawlogs. Sixty-two percent of this total forest area, or +1800 acres, represents a commercial forest base supporting 15 MM board feet presently growing at an estimated 200 board feet per acre per year producing +360 M board feet annually. Significantly, this commercial forest base could be increased by about 28% to +2300 acres in about 10 years by future timber stand improvement work identified and recommended in the 1977 inventory.



About 1,226 acres of the 1,800 acres is fully stocked with an average of 11,550 board feet of sawlogs per acre. This volume could support a harvest cut of about 250 M board feet per year over the next two decades in addition to added growth.

#### Timber Stand Improvement.

Timber stand improvements fall in two categories, improvements that result in income (commercial) and improvements that involve an outright investment (non-commercial). Timber sales are income producing and projects such as weeding, releasing, and pruning require outright investment. Both improvement categories were relied on at Blackwater for long-term, cumulative improvement of the forest. In fact, both categories were often followed by non-commercial timber stand improvement work in conjunction with the timber sale or immediately after removing cull trees in favor of younger, better-quality trees.

Over the past 25 years, 469 acres of non-commercial timber stand improvement work, or an average of about 19 acres per year, were completed on medium and better sites. Over 500 acres of commercial improvements or timber sales were done on medium to high priority sites for a total of 977 acres of timber stand improvements. These improvements represent 1/3 of the total forest area at Blackwater.

Commercial timber sales, as mentioned earlier in this report, had as their object the improvement of existing older stands by removing poor quality, high-risk trees, regulation of growth, and provision of early financial returns. These aims were primarily aimed at controlling stand growth through adjustments in stand density and species composition.

Non-commercial improvements were done for the improvement of younger stands or their establishment. Such projects included weeding sapling stands, release, chemical thinning, pruning, and planting.

Over the 25-year license, non-commercial improvements increased the commercial forest base from an estimated 1,332 acres in 1955 to 1,800 acres in 1979, or an increase of 35%.

Since some of the shrewdest silviculture is conducted at low intensity where much is accomplished with limited treatment, the goal of timber improvement projects at Blackwater was to work with the natural succession of tree species without expensive silvicultural treatments. Natural succession at Blackwater tends toward maintenance of stands of White Pine and mixed hardwood and softwood stands. Since 90% of the forest stands are softwoods or mixed, silvicultural activities were aimed at maintenance of these species. Soils in the Flood Control Area are excessively drained, and sandy. Such sites, at any stage of succession, are generally

inhospitable to growth of a large assortment of species. Therefore, maintenance of a few species, such as White Pine and a few northern hardwood species was, and is, relatively uncomplicated and inexpensive in the Flood Control Area.

#### Wildlife Resources

The most astute wildlife habitat improvement is accomplished by timber cutting primarily by setting back plant succession favorable to maintenance of game food and cover. Department of Resources and Economic Development practices were designed to maintain or establish preferred food and/or cover plants in cooperation with New Hampshire Fish and Game Department biologists wherever possible. Timber sale marking practices were modified to favor mast and den trees, and sale areas and sale schedules were dispersed to provide desired resources at the optimum place and time.

Partly as a result of timber cutting for the past 25 years and non-commercial projects specifically designed to improve wildlife habitat such as apple tree pruning and release, patch cutting of Aspen and Alder stands, and piling of slash for cover near food crops, the Blackwater Flood Control Area is presently considered good game habitat.

Hunting and trapping pressure has been moderate over the years but has substantially increased subsequent to 1955.

Construction of a new road system and improvement and maintenance of many miles of existing woods roads for forest management and protection purposes greatly increased access to the reservoir area. This road system plus construction of river access points also increased access for fishing.

The Blackwater River is fine trout habitat and was stocked with brook, brown, and rainbow trout yearlings each year. The river has good carry-over of stocked trout and also has good natural reproduction. Fisheries management coordinated with Fish and Game Department biologists was arrived at primarily by maintaining the natural character of the river. In addition, water quality protection upstream of the area has been a goal of State resource agencies. In addition to enforcement of hunting, fishing, and trapping laws, the New Hampshire Fish and Game Department also monitored the use of the area by sportsmen and initiated and monitored habitat improvement study areas.

#### Forest Protection

Forest protection activities carried out in the Blackwater Flood Control Area included pest and disease programs, forest fire protection, and protection from other agents such as wind, flooding, and mitigation of damage from heavy precipitation. Most notable were the blister rust programs,

extensive forest fire control program, and consistent silvicultural activities designed to minimize mortality and damage from windthrow, flooding, white pine weevil, and other damaging agents.

Prior to the forest management license in 1954 and establishment of the Blackwater Flood Control Project in 1940-41, there had been considerable State and Federal cooperation in combating blister rust in New Hampshire. Efforts primarily started in 1916 with a State and Federal blister rust statewide survey prompting passage of the blister rust control act by the New Hampshire legislature the following year. State appropriations were authorized to match Federal appropriations for control efforts stimulating local cities, towns, and private landowners to appropriate control. Control included survey, mapping, and Ribes eradication by local crews with technical assistance and supervision from State and Federal agencies.

During the 1925-1954 period about 1,900 acres were surveyed, mapped, and thousands of Ribes plants destroyed in the towns of Webster and Salisbury inclusive of the present Blackwater Flood Control Area. Intensive blister rust control efforts were initiated by the State Forester during the first three years of the forest management license, 1955-1957, surveying, mapping, and eradicating Ribes plants over the entire Flood Control Area (see attached 25-year summary sheet). This effort resulted in a considerable boost in mitigating serious consequences to future White Pine crops in the Flood Control Area very evident in the quality and stocking of White Pine present today. Periodic surveys and eradication works in 1963, 1965, and 1975-76 by the Department of Resources and Economic Development has eliminated the high risk of blister rust infection. The entire area is presently classified as a low-hazard area in a statewide "blister rust hazard" classification system.

State forest fire protection assistance to the towns of Webster and Salisbury, inclusive of the present Flood Control Area, dates back to the early 1900's when State funds were used to reimburse towns for half of forest fire suppression costs. In 1911, the New Hampshire legislature authorized the State Forester to appoint the District Forest Fire Chiefs to organize training and to equip town forest fire wardens responsible for initial forest fire suppression in their towns. This resulted in an effective and uniform statewide forest fire control program.

The State Foresters authority, however, to assist the towns of Webster and Salisbury with forest fire control in the area inclusive of the Flood Control Area ended upon Federal acquisition of the area in the late 30's and early 40's. This authority was not returned until the forest management license agreement was signed by the Federal Government and the New Hampshire Forestry and Recreation Commission in 1954. The license gave the State Forester shared responsibility for forest fire control in the Flood Control Area with local authorities.

Forest fire protection in the Blackwater Flood Control Area has been part of the statewide forest fire program involving three parts: prevention, surveillance, and suppression. Prevention was carried out by intensive public education and training programs, law enforcement, and mobile patrols by local and State personnel. All open fires required a permit issued by local forest fire wardens with authority from the State Forester.

Surveillance activities were carried out by State-owned fire towers on Mount Kearsarge, Oak and Craney Hills with excellent visibility of the area. Aerial patrols started in 1973 to supplement surveillance on high-risk days which greatly improved early detection and suppression efforts.

Local fire departments and forest fire wardens were responsible for initial forest fire suppression that occurred in the Flood Control Area. If needed, additional suppression assistance was available upon request through mutual aid from adjoining towns. The statewide forest fire program provided for regional manpower and equipment assistance, if needed, coordinated by the State District Fire Chief under authority of the State Forester.

All suppression costs were paid by the town in which the fire occurred reimbursed by the State for one-half of all approved costs. However, persons found responsible for any fires were billed for all suppression costs by the town.

Every two years, forest fire suppression plans were reviewed with local forest fire wardens by the State District Forest Fire Chief, reviewing forest fire hazard areas, access roads, water sources, equipment and supplies, manpower and suppression tactics, and other items to insure efficient and timely fire suppression in the area.

Silvicultural practices designed to protect forest fire stands and water quality were consistently applied in all forest practices from timber sales to timber stand improvement projects. The most notable silvicultural protection activities included alteration of timber marking and timber sale layout to alter species composition and age based on exposure and soil-site conditions to minimize losses from windthrow, ice damage, heavy snow, insect and disease attack, and requiring slash lopping on all timber sales to minimize fire hazard; limiting cutting along the Blackwater River to minimize soil disturbance and to maintain a buffer zone to keep water temperatures undisturbed; and maintaining a tree cover of White Pine over White Pine where possible to minimize damage from the White Pine Weevil.

#### Boundaries

The first major project undertaken after the signing of the license agreement was the deed research, location, and marking of the 27-mile

boundary of the Flood Control Area. This was a difficult and time-consuming project necessary to avoid trespass problems and improve visibility of the ownership. Boundary lines were blazed and painted with blue paint and maintained every ten years as needed consistent with other State Forest and Park boundaries.

#### Roads

Over four miles of new woods roads were constructed to provide access to previously inaccessible areas for forest management and fire protection purposes. Hunting and fishing activity greatly increased in the Flood Control Area after construction of the new road system. About 17 miles of roads were maintained and kept open for public access by brush cutting, drainage improvements, and grading. Department of Resources and Economic Development records show almost 2,500 yards of gravel and 17 culverts were needed for road improvements over the past 25 years. Road construction and maintenance was the most expensive forest management activity during the past 25 years and second to harvest improvement operations in altering the forest management potential of the Flood Control Area.

#### Factors Influencing Forest Management

##### Forest Fire Prevention and Suppression Plan

Blackwater Flood Control Area comprises 3,535 acres, located in parts of two towns. All of the area is within forest fire district number 2. As access to the area is somewhat limited, the forest fire risk is not high. Forest fire protection is provided jointly by the Division of Forests and Lands and fire departments of the towns of Salisbury and Webster.

Fire prevention is carried out in two ways. Public education through the use of mass media and posting of fire prevention posters, and law enforcement utilizing periodic patrol of heavily used areas to detect illegal camp and debris burning fires.

Articles are placed in local newspapers several times a year informing the public about the forest fire danger. As the danger increases the frequency of these articles increases. In addition, radio stations are utilized to broadcast fire prevention messages.

Annual posting of forest fire prevention signs, supplied by the Division of Forests and Lands to local forest fire wardens, is encouraged. These posters are located at places where the public recreates and at access roads used by the public to gain entrance to woodlands in the Flood Control Area.

When the forest fire danger reaches a level requiring a partial or total woodland closure, posters stating the situation will be placed at each point of entry to the Flood Control Area.

Periodic mobile patrol will be made through the Flood Control Area to be sure that the provisions of the closure proclamation are followed. These patrols to be made by local and State Forest Fire personnel.

All requests for forest fire permits must be made to the forest fire warden having jurisdiction of the area in which the fire is to be kindled.

Fire permits for camp fires shall not be issued without a letter from the Director, Division of Forests and Lands approving the request for a camp fire.

Detection and reporting of a forest fire on flood control property will come from one of three sources:

Public - Through the use of mass media public awareness of forest fires has increased. Because of this awareness, between 40 and 50 percent of all forest fire starts throughout our State are reported by the public.

The flood control area is no exception to this fact. As most of the area is surrounded by land that is higher in elevation, citizens are able to observe a smoke readily. This fact could increase the percent of fires reported in this manner.

Fire Towers - The Division of Forests and Lands maintains three forest fire towers that look into the flood control area.

Mt. Kearsarge to the northwest has an unobstructed view of the entire Blackwater Flood Control Area. Oak Hill to the east and Craney Hill to the south have excellent visibility of the area.

Aerial Patrol - This area lies between air patrol routes one and two. Consequently, aircraft operating on either patrol route is able to detect forest fires in this flood control area. Aircrafts are used for detection to assist fire towers as the forest fire danger increases.

Initial attack of all grass, brush and forest fires that occur within flood control boundaries will be handled by the fire department and forest fire warden of the town in which the fire occurs. The local warden shall immediately notify the appropriate district fire chief of the Division of Forests and Lands.

If additional manpower and equipment are required to gain control of the fire, the town forest fire warden may call for such assistance as he deems necessary. Aid will come from city and town fire departments that are in mutual aid agreement with the responsible town. If more aid is required, the warden may ask the district chief to request help from the Northeast Forest Fire Protection Commission.

All fire suppression costs will be paid in the first instance by the town in which the fire occurs. Upon investigation of the fire cause, if a responsible person can be found, then that person, or persons, shall be billed for all costs related to that fire by the town.

If no responsible person can be found, then the town shall send a bill on appropriate form to the Division of Forests and Lands. Once the bill is approved by the State Forester, then a check for one-half of suppression costs shall be sent to the town.

The District Fire Chief shall review forest fire suppression plans with the forest fire wardens that are responsible for suppression action within flood control boundaries.

This review shall include a check on available resources, as listed in the appendix of this plan; inspection of forest fire hazards, such as recent timber sales to preplan suppression tactics; inspection of access roads and water sources; and other items that will aid in forest fire suppression. This review shall be completed once every two years. See town resource plans Section 11 page 7.

#### Forest Insect and Disease Management.

The goal of forest insect and disease management for the Blackwater Flood Control Area is to protect the forested areas and associated resource values from losses caused by insect or tree disease agents.

Forest insect and disease activities have been directed toward white pine blister rust, white pine weevil, and red pine root rot at Blackwater. The predominance of pole-size and mature white pine, low ribes populations, and generally low humidity present a low blister rust hazard for the foreseeable future. Red pine root rot occurrence has not been detected and is no longer considered a potential problem at this location. However, Scleroderris canker, a serious and tree-killing fungus disease of red pine has been detected in northern New Hampshire and now presents a real threat to the red pine plantations. The general prevalence of white pine weevil also continues to be a problem in the management and harvesting of white pine.

Recommendations for reducing weevil damage should emphasize harvesting techniques which provide high density pine reproduction or permit partial overstory protection during the first twenty year's growth of young pine stands. Frequent detection surveys to locate and identify any initial Scleroderris infections will be necessary to bring the present red pine stands to maturity. Any additional planting of red pine for soil stability or marketing purposes must be made with disease-free nursery stock to prevent infection of stands already present. Continued general surveillance and pest detection surveys will be done by this Department to

detect new potential forest pest problems and provide assurance that old problems do not get out of hand due to changing conditions within the present forested areas.

#### Erosion

Blackwater Dam is subject to moderate water level fluctuations. Bank erosion is not a critical problem at the project, but a few sites should receive remedial attention. One area of particular concern is the pool below Burbank's Mill. This scenic area is informally managed for recreation by project personnel. The shade of the trees, combined with clear and gentle waters, create a pleasant spot for summer recreation. Gabion weirs to protect the bank combined with reseeding of the bank with grasses, would halt the erosion.

#### Effects of Inundation on Forest Stands

Mortality rates are highest when impoundments occur during the growing season. Those which occur in late fall, winter, or early spring are generally not harmful to trees if physical damage does not result. The primary cause of mortality is damage to root structures and siltation on leaf parts which upset normal transpiration and photosynthesis. Defoliation is a frequent result. Coniferous species generally suffer a higher mortality rate because deciduous species can more often tolerate defoliation.

As a result of mortality from flooding, the cover type adjacent to the pools where flooding is most frequent is changing from forest to open land, or in some cases, to a more flood-tolerant species than was originally present. The effect on vegetation of inundation caused by the regulation and impoundment of water at six New England flood control reservoirs during the June - July 1973 flood was assessed from color infrared photography and corroborative ground surveys. The results are contained in the U.S. Army Cold Regions Research and Engineering Laboratory's (CRREL) Special Report 220, Inundation Damage to vegetation at Selected New England Flood Control Reservoirs, dated March 1975.

#### Short Range Management Plan

Short range work is listed in the Five Year Work Plan. See Section 10 page 1.

#### Long Range Management Plan

The primarily long-range plan is to wisely utilize and protect the forest resource at Blackwater Reservoir, and to review forest management efforts every five years.



## SECTION 6. FISHERIES MANAGEMENT

### Existing Management

Present fisheries management is being conducted by the New Hampshire Fish and Game Department. See complete list of fish species found in Blackwater River, Section      page      . Annual stocking of Blackwater River includes three species of trout: Brook Trout (Salvelinus fontinalis), Brown Trout (Salmo trutta), and Rainbow Trout (Salmo gairdneri). Numbers of fish released varies according to the area and the availability of stock from the hatcheries.

### Factors Influencing the Management of Fish Species

#### Habitat and Level Fluctuations

Extreme seasonal fluctuations of water level affect cover shelter and reproduction habitat. While yearly water level fluctuations do not eliminate entire populations, they may decrease numbers considerably.

Habitat types which may be found include: fallen timber and brush, old snags, rocky and sandy bottoms, underwater caves and aquatic weed beds. All may be influenced by swift currents, slow to moderate currents or still waters.

#### Pesticide Use

The principle pesticides which have been used in the project area have been: Simazine, for treating rock embankments of the dam, and 2, 4, D for broadleaf plants and brush. When applied using Environmental Protection Agency regulations, these chemicals have limited effects on aquatic vegetation and fish species. 2,4,5-T, which has not been used since 1971, has since been suspended by EPA for all uses. Although the effects of pesticide use at the project are almost non-existent, other effects from local resident use and run-off from private properties will be studied more closely.

#### Public Pressure

Access to all portions of the Blackwater River is good. Generally, roads run parallel to the river; South Road Bridge and Peter Bridge offer additional access. Fishing pressure is light and has little or no effect outside the fishing season. Fishing pressure is moderate to heavy after New Hampshire Fish and Game Department stocks the rivers, but it tapers off rapidly.

A creel census should be undertaken to reveal any other uses which should be considered in the management plan.

Boat travel on the river is light, with canoes being the predominant craft.

#### Short Range Management

A creel census will be undertaken to determine angler and public utilization and interest in the Blackwater River. Census data will assist managers in determining the adequacy or necessity of the existing program. A survey of this type will reveal the most intensive fishing periods, types of fish sought, length of time spent fishing, angler origin, type of gear used, and size and number of fish taken. Running throughout the four seasons, the census will begin immediately after the public is made aware that stocked fish have been put into this area. The creel census should be continued for several years; however, this decision will be made after the first year is completed.

Deadfalls should be cleared out and boat launch areas improved for easier access by fishermen.

A study of artificial habitats for trout will be made. Often time artificial nesting structures provide critical cover which improve survival and reproduction of the species.

#### Long Range Management

The stocking program will be reassessed in light of results from the creel census, mapping of habitat types present and conditions and requirements of various species in the Blackwater River.

## SECTION 7. WILDLIFE MANAGEMENT

### Existing Management

The Blackwater Reservoir is generally considered good game habitat. The species present include, in order of importance: white-tailed deer, ruffed grouse, snowshoe hare, woodcock, waterfowl, and grey squirrel. In addition, there are numerous furbearers which inhabit the basin including beaver, muskrat, mink, otter, fisher, raccoon, skunk, fox, bobcat, and weasels.

Hunting pressure on this public area is considered moderate and the wildlife resources are considered in balance at the present time.

New Hampshire Fish and Game has completed a woodcock habitat improvement project near Smith Corner. Wood duck boxes have been placed in various locations including Greenough's Pond and Plains Road by both the Corps and New Hampshire Fish and Game. New Hampshire game laws are enforced by Conservation Officers. Pheasant stocking and hunting exist on a put-and-take basis. A deer population is present but no survey as to the size has been undertaken.

Waterfowl do breed in the area and the species most often found are Wood Duck (Aix sponsa), Hooded Merganser (Lophodytes cucullatus), and Black Duck (Aus rubripes). There is moderate hunting pressure on all species. Although a waterfowl census has not been conducted, managers believe that populations probably include representatives of all native species at one time of the year or another.

Moose and bear have been reported in the area, but probably occur only as occasional migrants.

New Hampshire Fish and Game Department has issued trapping permits. Results of the trapping indicate that population levels of beaver, mink, otter, fisher, muskrat, raccoon, and red fox remain fairly constant. Drastic weather changes, forestry practices and individual population dynamics cause the major changes in population levels. A complete list of mammals found at Blackwater is included in Section 11 page 3 and a partial list of birds is included on Page 11-4.

### Factors Influencing Wildlife Management

#### Characteristics of the Reservoir Area

There are approximately 550 acres of open land at Blackwater; a portion of that is leased for agriculture and grazing. Non-leased areas are in open field or old field growing up with brush and trees.

Blackwater Reservoir land includes marshed, swamps, and wet meadows. Wetlands occur along Chairfactory Road, Plains Road and Greenough's Pond. Though only a small portion of the total project land, these areas do provide a wetland environment for various waterfowl, mammal, and plant species. Wetland types are defined as follows:

1. Marsh - significant area of open water, contains herbaceous materials; usually ringed with woody plants.
2. Wet Meadow - wet areas containing mostly grasses, sedges, rushes.
3. Swamps - wooded wetland; wet in spring, frequently dry in winter, often contain an undergrowth of herbaceous plants.

There is a diversity of wildlife habitat present at Blackwater. The reservoir includes different types of forest stands that are of different ages and are productive for a wide variety of wildlife. Through different forest management practices managers can promote one or more groups of wildlife.

#### Endangered, Threatened, and Rare Species

Those species listed in the Federal Register as "endangered" are eligible for benefits provided by the Endangered Species Conservation Act of 1973. "Threatened" species are also eligible for endangered species benefits. Under the same legislation, "special consideration" is given to those species which may not be threatened throughout their entire range in the United States but have declined significantly in a particular area such as New Hampshire.

Those endangered species which may pass through the Blackwater Dam and Reservoir project are the Bald Eagle (Haliaeetus leucocephalus) and the American Peregrine Falcon (Falco peregrinus anatum).

Those threatened species which may be present or may pass through are the Southeastern Pine Grosbeak (Pinicola enucleator eschatosus), Eastern Pigeon Hawk (Falco columbarius), American Osprey (Pandion haliaetus carolinensis).

Those species of special concern include Common Loon (Gavia immer), Barn Owl (Tyto alba prunticola), and Eastern Bluebird (Sialis sialis), and New England Cottontail (Sylvilagus transitionalis).

#### Habitat Improvement

Habitat improvement should be considered wherever feasible. It will improve the quality and/or quantity of wildlife in the area. Several basic requirements or projects are listed below:

- a. Fields should be kept open and free of invading trees.
- b. Release and fertilization of apple trees.
- c. Planting or release of mast-producing trees and fruit-bearing trees and shrubs next to or within wooded areas.
- d. Slash generated from forest management practices should be gathered in piles to provide cover for small mammals and should not be left in streams.
- e. Cavity trees within 1,000 feet of wetlands should be retained.
- f. Food producers such as oak, beech, and black cherry should be favored and retained to rotational age.
- g. Plantings of spruce for rabbit habitat in various areas.

#### Forest Management Effects on Wildlife

Forest management practices may affect wildlife populations through changes in habitat. Any extensive timber improvement practices and harvesting should be carefully planned to avoid adverse impacts on local wildlife.

#### Hunting Impact

During deer season there is moderate hunting pressure in various areas. The number of hunters for deer as well as other game species has increased and should be monitored closely.

Waterfowl hunting at Blackwater has a minimal impact on migrating waterfowl species.

No hunter survey has been taken at Blackwater to determine numbers of hunters, length of time spent hunting and number of game species observed. A survey will help future planning and possible habitat improvement.

#### Short Range Management Programs

##### Roads

Roads that are not maintained of Class C (passable by light duty trucks) should be reseeded for wildlife habitat and should be blocked, but opened in October and November for hunter use. These roads include spurs off major roads in the reservoir.

##### Wood Duck Boxes

The wetlands at Blackwater appear to offer much potential for waterfowl habitat. Additional wood duck boxes should be installed, in coordination with New Hampshire Fish and Game Department.

#### Food Plots

Included in agricultural lease agreements should be agricultural leaseholders leave portions of grain crops or grasses for wildlife food and habitat. This food source would be of particular benefit to recent restocking of wild turkey in the Blackwater area, as well as native wildlife.

#### Specific Long Range Programs

##### Maintenance of Wildlife Resources

Maintain the present wildlife resources through planning, coordination, and enforcement, and in conjunction with forestry practices, try to improve upon existing habitat.

##### Furbearers and Other Game Species

Continue present management through controlled trapping and coordinated forest management practices.

##### Habitat

As funds become available, carry out management of wildlife openings by creation and maintenance, sub-impoundments constructed and continued monitoring of habitat resources.

##### Mapping of Wildlife and Vegetation Types

A complete vegetation type map that also shows wildlife use should be prepared and included with this plan prior to the next revision (five years). The maps will need periodic updating because of TSI, habitat improvement and timber harvests.

##### Education

Education of the public as to wildlife management activities at Blackwater Reservoir should be encouraged for a better understanding of total resource management. This can be accomplished through the media, workshops and meetings for the public.

## SECTION 8. RESEARCH NEEDS

Several areas of research are proposed which are necessary for sound ecological management of Blackwater's natural resources.

### Rare, Endangered, Threatened Species

Before intensive forest management activities are carried out, the operating areas will be examined for the presence of rare species, especially plants. Endangered species other than those mentioned in this plan may occur at Blackwater.

### Effects of Inundation on Wildlife and Forest Tree Species

There is a need to understand the effects of inundation caused by present flood control operations and by possible future hydropower storage at Blackwater to plan improvement practices, future stockings, tree plantings and other related wildlife and forestry operations.

### Inventories

Before a five-year revision of this plan is undertaken, a thorough review of the forest inventory data currently available will be made to determine whether additional data is needed. Included is establishment of forest growth plots for analysis of tree growth and mortality.

### Subimpoundments

Potential subimpoundment sites for wetland enhancement within the reservoir should be identified and evaluated in a wetland inventory.

### Acid Rain

The soils at Blackwater as well as the entire Merrimack River Basin are vulnerable to decreases in pH due to the impact of airborne contaminants deposited by rain. The reservoir (and others) should be evaluated for possible long range monitoring activities in cooperation with Federal, State and other agencies.

## SECTION 9. RECOMMENDATIONS FOR IMPLEMENTATION OF MANAGEMENT PLAN

- A. Meet with all coordinating agencies having an interest in the management of the Blackwater Flood Control Reservoir and review with them their plans for the area, pertaining specifically to their areas of expertise.
- B. Review the most recent forest inventory.
- C. Coordinate recommendations from forest inventory with those recommendations from coordinating agencies.
- D. Develop five-year work plan. (Be specific)
  - 1. Harvesting operation: compartments, stands, acres, volumes, types of operation
  - 2. Timber stand improvement: compartments, stands, acres, type of operation
  - 3. Road maintenance: location, distances, treatment
  - 4. Boundary lines
  - 5. Refuse removal
  - 6. All other activities that might require planning and implementation
- E. Schedule work program for immediate year
  - 1. Expenditures expected
  - 2. Revenue expected
  - 3. Personnel
- F. Review accomplishments for immediate year
- G. Update work plan annually



## SECTION 10. FIVE-YEAR WORK PLAN

### Forest Management Work Plan

#### Harvest Improvement

1980 - 1981	Compartment 2	Stands 14-21-25	300 MBF
1981 - 1982	Compartment 2	Stands 11-18	325 MBF
1982 - 1983	Compartment 4	Stands 2-3-4	300 MBF
1983 - 1984	Compartment 1	Stands 2-3-12	225 MBF
1984 - 1985	Compartment 2	Stands 2-3	200 MBF
Alternate	Compartment 3	Stands 1-6-10	200 MBF

#### Timber Stand Improvement

1980 - 1981	Compartment 1	Stand 9	
	Compartment 2	Stand 17	35 Acres
1981 - 1982	Compartment 2	Stands 20-31-32-35	54 Acres
1982 - 1983	Compartment 4	Stands 1-7-11	48 Acres
1983 - 1984	Compartment 4	Stand 20	
	Compartment 5	Stands 4-8-11	39 Acres
1984 - 1985	Compartment 5	Stands 1-17-18	46 Acres

### Fish and Wildlife Work Plan

#### Census

Census can be accomplished in conjunction with regular forestry activities. Most needed is location, extent and condition of special habitats - deer yards, fruit and nut-bearing trees, shrubs, aspen stands, wetlands, old fields, softwood thickets. These areas should receive special treatment beyond forestry programs.

Mapping of vegetation types will be undertaken as soon as possible. Mapping of wetlands (classifications) will be included. Wildlife census, survey or mappings should be reviewed and coordinated with the New Hampshire Fish and Game Department.

#### Food Plots, Habitat Improvements

Identify and map areas for possible improvements and prepare and investigate ways for proper utilization. Coordinate with New Hampshire Fish and Game Department.

Wood Duck Boxes (yearly activity)

Clean and replace boxes each year, adding new ones where needed.

Education (yearly activity)

Include fish and wildlife with forestry and other management disciplines when giving programs and dealing with the public.

# SECTION 11. TABLES AND MAPS

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Index of Soil Series Present at Blackwater Reservoir

Acton  
Agawam  
AuGres  
Gloucester  
Hinckley  
Muck and Peat  
Ondawa  
Podud  
Ridgebury  
Rumney  
Saco  
Scarboro  
Shapleigh - Gloucester  
Suncook  
Windsor  
Woodbridge

Mammals Occurring in the Project Area

<u>Common Name</u>	<u>Scientific Name</u>
Beaver	<u>Castor canadensis</u>
River Otter	<u>Lutra canadensis</u>
Fisher	<u>Martes pennanti</u>
Muskrat	<u>Ondatra zibethica</u>
Mink	<u>Mustela vison</u>
Red Fox	<u>Vulpes fulva</u>
Woodchuck	<u>Marmota monax</u>
Porcupine	<u>Erethizon dorsatum</u>
Eastern Chipmunk	<u>Tamias stratus</u>
Gray Squirrel	<u>Sciurus carolinensis</u>
Red Squirrel	<u>Tamiasciurus hudsonicus</u>
Southern Flying Squirrel	<u>Glaucomys volans</u>
Raccoon	<u>Procyon lotor</u>
White-tailed Deer	<u>Odocoileus virginianus</u>
American Black Bear	<u>Ursus americanus</u>
Star-nosed Mole	<u>Condylura cristata</u>
Hairy-tailed Mole	<u>Parascalops breweri</u>
Common Shrew	<u>Sorex cinereus</u>
Little Brown Bat	<u>Myotis lucifugus</u>
Keen Myotis	<u>Myotis keenii</u>
Big Brown Bat	<u>Eptesicus fuscus</u>
Eastern Skunk	<u>Mephitis mephitis</u>
Moose	<u>Alces alces</u>
Deer Mouse	<u>Peromyscus maniculatus</u>
White-footed Mouse	<u>Peromyscus leucopus</u>
Field Mouse	<u>Microtus pennsylvanicus</u>
Southern Bog Lemming	<u>Synaptomys cooperi</u>

Partial List of Birds Found in Project Area  
(including seasonal species)

<u>Common Name</u>	<u>Scientific Name</u>
Common Merganser	<u>Merqus Merganser</u>
Red-breasted Merganser	<u>Merquis serrator</u>
Common Goldeneye	<u>Buccephala clangula</u>
Bufflehead	<u>Bucephala albeola</u>
Canvasback	<u>Aythya valisineria</u>
Lesser Scaup	<u>Aythya affinis</u>
Wood Duck	<u>Aix sponsa</u>
Blue-winged Teal	<u>Anas discors</u>
Green-winged Teal	<u>Anas carolinensis</u>
American Widgeon	<u>Mareca americana</u>
Mallard	<u>Anas platyrhynchos</u>
Black Duck	<u>Anas rubripes</u>
Canada Goose	<u>Branta canadensis</u>
Snow Goose	<u>Chen hyperborea</u>
Marsh Hawk	<u>Circus cayaneus</u>
Goshawk	<u>Accipiter gentilis</u>
Red-tailed Hawk	<u>Buteo jamaicensis</u>
Broad-winged Hawk	<u>Buteo platypterus</u>
Bald Eagle (visitor)	<u>Haliaeetus leucocephalus</u>
Peregrine Falcon	<u>Falco peregrinus</u>
Kestrel	<u>Falco sparverius</u>
Great Blue Heron	<u>Ardea herodias</u>
American Bittern	<u>Botaurus lentiginosus</u>
Great Horned Owl	<u>Bubo virginianus</u>
Saw-whet Owl	<u>Aegolius acadicus</u>
Mourning Dove	<u>Zenaidura macroura</u>
Common Crow	<u>Corvus brachyrhynchos</u>
Ring-Necked Pheasant (stocked)	<u>Phasianus colchicus</u>
Ruffed Grouse	<u>Bonasa umbellus</u>
American Woodcock	<u>Philohela minor</u>
Common Snipe	<u>Capella gallinago</u>
Killdeer	<u>Charadrius vociferus</u>
Belted Kingfisher	<u>Megasceryle alcyon</u>
Yellow-shafted Flicker	<u>Colaptes auratus</u>
Yellow-bellied Sapsucker	<u>Sphyrapicus varius</u>
Hairy Woodpecker	<u>Dendrocopos villosus</u>
Downy Woodpecker	<u>Dendrocopos pubescens</u>
Horned Lark	<u>Eremophila alpestris</u>
Blue Jay	<u>Cyanocitta cristata</u>
Black-capped Chickadee	<u>Parus atricapillus</u>
White-breasted Nuthatch	<u>Sitta carolinensis</u>
Robin	<u>Turdus migratorius</u>
Cedar Waxwing	<u>Bombycilla cedrorum</u>

Common Name

Starling  
Red-eyed Vireo  
House Sparrow  
Red-Winged Blackbird  
Scarlet Tanager  
American Goldfinch  
Dark-eyed Junco  
Song Sparrow  
Chipping Sparrow

Scientific Name

Sturnus vulgaris  
Vireo olivaceus  
Passer domesticus  
Agelaius phoeniceus  
Piranga olivacea  
Spinus tristis  
Junco hyemalis  
Melospiza melodia  
Spizella passerina

Species of Fish Reported from Blackwater River

<u>Common Name</u>	<u>Scientific Name</u>
Brook trout	<u>Salvelinus fontinalis</u>
Brown trout	<u>Salmo trutta</u>
Rainbow trout	<u>Salmo gairdneri</u>
Chain pickerel	<u>Esox niger</u>
White sucker	<u>Catostomus commersoni</u>
White perch	<u>Morone americana</u>
Smallmouth bass	<u>Micropterus dolomieu</u>
Brown bullhead	<u>Ictalurus nebulosus</u>
Pumpkinseed	<u>Lepomis gibbosus</u>
Bluegill	<u>Lepomis macrochirus</u>



# BLACKWATER FOREST INVENTORY

## MERCHANTABLE TIMBER VOLUME SUMMARY

<u>Compartment</u>	<u>Acres</u>	<u>Merchantable Timber Volume in Board Feet</u>		<u>Total Merchantable Volume in Board Feet</u>	<u>Average/Acre Board Foot Vol.</u>
		<u>Hardwood</u>	<u>Softwood</u>		
1	274.5	626,833	2,026,019	2,652,852	9,668
2	905.0	1,362,990	6,211,893	7,574,883	8,370
3	152.0	233,586	866,404	1,099,990	7,237
4	324.0	694,437	2,070,763	2,765,200	8,529
5	289.0	742,251	1,743,495	2,485,746	8,601
6	279.5	320,534	2,024,239	2,344,773	8,389
7	445.0	821,514	3,129,066	3,950,580	8,878
8	<u>249.5</u>	<u>405,398</u>	<u>1,063,037</u>	<u>1,468,435</u>	<u>5,886</u>
	2918.5	5,207,543	19,134,916	24,342,459	8,341

Data is based on 1977 Forest Inventory

# SILVICULTURAL TREATMENT

Compartment	Timber Stand Improvement (acres)		Sawtimber Harvesting (acres)	
	<u>Medium</u>	<u>High</u>	<u>Medium</u>	<u>High</u>
1	21	52	114	32
2	75	0	452	148
3	0	8	64	54
4	45	0	126	86
5	10	0	89	108
6	42	23	163	40
7	33	102	262	21
8	<u>74</u>	<u>24</u>	<u>37</u>	<u>46</u>
	300	209	1307	535

Data is based on 1977 Forest Inventory

Tract: Blackwater

Inventory Date: 6-77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 1

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood		
1	13.2	WP RO RM 4+3	26677	139884	166561	12618
2	11.9	WP RO 4+3	43066	117739	160805	13514
3	28.8	RO RM 3+4	187931	15877	203808	7074
4	21.1	WP RM BR 4+3	43700	111760	155460	7366
5	12.5	WP 5		212592	212592	17007
6	7.4	WP RM 3	11060	34973	46033	5227
7	37.6	WP 3+4	37442	282356	819798	8506
8	46.1	HE WP RM 3+4	97727	365850	463577	10057
9	6.2	WP 2+3	10824	22582	33406	5387
10	14.3	WP 3+4	20835	116712	137547	9618
11	36.8	WP RO RM 3+4	113778	254209	367987	9998
12	19.8	WP 4+5	8375	294236	302611	15284
13	5.2	WP RM RO 4+3	13198	16897	30095	7769
14	13.0	WP 3+4	12220	40352	52572	4044
TOTAL	274.4		626833	2026019	2652852	9668

Tract: Blackwater

Inventory Date: 7-77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 2

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume Board Feet	Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood	
1	32.1	WP RM 4-3	05564	203629	275451 8597
2	29.8	WP 5-4	3427	323046	326423 10954
3	20.6	WP-RM SP 5-3	9285	306993	316278 15353
4	13.5	WP 3-4	9041	73381	82422 6105
5	10.7	WP 4	0	72134	72134 6741
6	43.1	HE RM 4-3	86834	211783	298717 6931
7	34.3	WP HE 4	28229	468449	496678 14480
8	19.5	RM SP-WP 3-5	1631	54479	70840 3632
9	24.6	HE 3-4	58737	106715	165452 6725
10	38.4	HE-WP BR 3-4	129505	184416	50349 13122
11	25.8	WP HE 4	62407	304075	434895 16856
12	31.4	HE WP 3-4	27767	2072397	300064 9555
13	12.3	HE RO-BR 4-3	49607	63554	113161 9199
14	26.2	WP HE 5-2	79692	363847	413608 15683
15	30.3	WP RO 4-3	66399	364309	430708 14215
16	28.2	HE 4	74607	189947	264554 9381
17	28.9	HE RM 3	91904	121764	213668 7394

CONTINUED

Tract:

Inventory Date:

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 2

Stand No.	Forest Type- Acres Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
		Board Feet			
		Hardwood	Softwood		
18	45.2 WP RM 4-3	32341	521198	553539	12247
19	33.5 WP-SP RM 4-3	26525	178041	204566	6107
20	30.0 HE 4-3	29073	164390	193463	6449
21	16.8 WP HE 4-3	20479	190621	211100	12566
22	18.9 WP RP 3-4	13068	231988	245056	12966
23	9.4 WP 3-2	0	30545	30545	3250
24	16.8 WP 4	0	158723	158723	9488
25	32.6 WP HE 4	443036	265246	309549	9496
26	42.5 RM E RO 4	138670	46172	184848	4350
27	24.2 RM BR 4	114199	42864	157063	6490
28	21.9 WP HE 4	21609	151773	173382	7917
29	27.9 HE WP-RM 4-3	17272	218195	235467	8440
30	13.0 WP RO 4-3	9241	68403	77644	5626
31	8.5 WP BR 1-2	0	0	0	0
32	9.4 WP BR 3-2	0	32775	32775	3487
33	13.5 HE WP 4	10281	142382	152663	11308
34	9.6 SP RM 3	16320	65511	84068	8757
35	6.9 WP-RM SP 4-3	10702	20749	31451	4558
TOTAL	905	1362990	6211893	7574882	8370

Tract: Blackwater

Inventory Date: 7/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 3

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood		
1	21.0	White Pine 5 Hemlock, Red	8942	826670	335612	15981
2	17.7	Maple, Birch 3	19966	40136	60902	3441
3	13.9	Hemlock 4	32476	149297	181773	7077
4	12.2	White Pine 4	6404	68045	74449	6102
5	10.8	Red Maple 2-3 White Pine-Red	7614	--	7614	705
6	9.0	Maple 5-3	27918	79116	107034	11893
7	4.1	White Pine 2-3	--	2983	2983	728
8	10.3	Red Maple 3-2 White Pine - Tamerac	28078	--	28078	2726
9	8.1	Red Maple 3-2	--	5893	5893	728
10	24.9	White Pine 4-5 Hemlock, Red	38386	141609	179995	7228
11	4.6	Maple, Spruce 3 White Pine, Red	3174	9280	12454	2708
12	15.4	Oak, Red Maple	459828	43375	103203	6701
TOTAL						

Tract: Blackwater

Inventory Date: 7/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 4

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.		
			Board Feet					
			Hardwood	Softwood				
1	11.8	WP RO 4-3	14831	62038	76969	6521		
2	19.2	WP RP 4	N/A	165754	165754	9506		
3	31.0	WP RO 4	54074	369204	423278	13654		
4	32.4	HE WP 4	69113	228622	297735	9189		
5	9.6	RM WP 4	97664	23125	42076	4383		
6	25.7	RM RO 4	97664	11305	108969	4239		
7	15.1	HE RM RO 4	42151	36523	78674	5210		
8	13.8	RM 4	55310	8901	64211	4653		
9	7.1	WP RP 4	N/A	135329	135329	19061		
10	12.5	HE WP RO 4	44175	74196	118371	9369		
11	21.1	WP 4-3	35701	120551	156252	7404		
12	22.8	WP RO 4	60573	184011	244584	10629		
13	6.4	RM SP BR 3	10694	8784	19478	3044		
14	9.3	WP RO RM 4-3	14100	67628	81728	9846		
15	6.4	HE RO 4	25446	32353	57799	9032		
16	25.2	HE WP 4	72248	232357	304605	12087		

17	12.9	WP RO HE 4	35441	105114	140555	10896
18	22.5	WP RO HE 4-3	31090	96116	177206	5654
19	12.0	WP 5-4	9814	108852	118666	9889
20	8.4	WP BO HE 3-4	2961	56664	59625	7098
TOTAL	324.2		694437	2070763	2765200	



Tract: Blackwater

Inventory Date: 7/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 5

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Board Feet			
			Hardwood	Softwood		
1	9.4	Hemlock, Red Oak 4	31810	11238	43048	4581
2	32.4	White Pine - Red Oak 4-3	55502	305493	360932	11142
3	25.7	Red Oak, Hemlock- White Pine 3-4	86393	246364	313757	12908
4	12.7	Red Maple, Birch, Elm 3	53187	21450	7463	5878
5	20.1	White Pine, Red Oak 4	17668	149135	166803	8049
6	22.6	White Pine, Red Oak-Red Maple 4-3	43144	69838	112982	4999
7	5.7	Red Maple, Red Oak  Hemlock 4	17596	17647	35243	6183
8	10.1	Red Maple, White  Pine 3	24687	17635	42322	4131
9	19.3	Red Oak, Red Maple, Birch 4	138105	11120	149261	7815
10	15.3	Red Oak, Red Maple 4	34745	65671	1000416	6563
11	7.8	White Pine, Birch 3	12675	31771	44446	5698

12	15.6	Red Oak, White Pine-Red Maple	28164	109496	137660	8824
13	24.1	Hemlock, White Pine Red Maple 4	68354	124046	199945	8296
14	24.1	White Pine, Red Pine 4	32848	339037	371885	15431
15	10.0	White Pine-Red Maple Birch 4	37801	112512	120313	12031
16	12.0	White Pine, Red Oak 4	25200	66348	91548	7629
17	15.3	Red Oak, White Pine 3	60288	34694	94982	6208
18	6.7	Red Maple, Elm 3	4724	0	4724	705
TOTAL	289		742251	1743495	2485746	8601

Tract: Blackwater

Inventory Date: 7/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 6

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood		
1	17.8	White Pine 3-4	16643	110215	126858	7127
2	10.7	White Pine, Birch 3	--	31396	31396	2934
3	23.4	White Pine-Red Maple Birch 4-3	14789	81372	96169	4109
4	13.8	White Pine 4-5	59402	38367	97769	7084
5	11.8	White Pine 2-3	21629	44449	66078	5600
6	7.6	Red Oak- Red Maple 4-2	29708	2451	32159	4230
7	17.4	White Pine - Red Maple 4-3	34733	162069	196802	11301
8	19.3	White Pine, Aspen Birch 3	13317	62903	76220	3949
9	12.5	Red Pine 2-3	--	--	--	--
10	4.9	White Pine, Red Maple 4	6564	35053	41617	8494
11	24.3	White Pine, Red Pine 4	14516	286378	300894	12382
12	33.5	White Pine-Red Oak 4-3	37197	286316	323513	9658
13	28.0	White Pine, Hemlock 4	35592	239086	274678	9810
14	14.7	White Pine 4	14139	86837	1000976	66869

15	8.6	White Pine, Red Oak 4	22305	61585	83890	9753
16	22.7	White Pine 4-3	--	177693	177693	7228
17	9.3	Red Maple, White Pine 4	25148	31691	56839	6113
TOTAL 297.5			320534	2024239	2344773	

Tract: Blackwater

Inventory Date: 8/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 7

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood		
1	21.6	WP BR 3-2	12182	179139	191321	8857
2	13.4	HE RO 4	17162	122339	139501	10410
3	18.4	RM BR 3	49738	53080	102818	5587
4	21.8	HE BR 4	39048	221117	260165	11935
5	27.5	RM WP 3-5	36631	163228	199856	7267
6	21.7	RM HE 3	42428	52757	95185	4386
7	15.4	WP HE 4-3	23757	198302	222059	14419
8	16.8	WP AS 3	2318	20859	23177	1386
9	19.3	HE WP 3-4	33489	84063	117552	6090
10	20.8	HE WP 4	112969	184793	297762	14315
11	26.4	WP RO 4-3	36459	234131	270590	10249
12	18.1	WP RO HE 4-3	12761	41235	53996	2983
13	8.4	WP RP 4	N/A	68647	68647	8172
14	11.5	HE WP 3-4	4864	119701	124565	10832
15	31.1	HE RO 4-3	45458	452109	497467	15999
16	21.8	RO WP RM 4-3	104304	45167	149471	6856
17	35.1	RM RO 4	165041	20597	185638	5288
18	21.6	RM WP 3-4	26828	1000202	127030	5881

19	34.4	WP RP 4	9342	539449	548791	15954
20	12.9	RP 2-3	N/A	N/A	--	--
21	13.2	WP RO 4-3	9257	221377	230634	17479
22	13.9	RM 4	37478	6874	44352	3190

Tract: Blackwater  
Inventory Date: 9/77

STATE OWNED FOREST INVENTORY  
MERCHANTABLE TIMBER VOLUME SUMMARY

COMPARTMENT 8

Stand No.	Acres	Forest Type- Size Class	Merch. Timber Volume		Total Merch. Vol Board Feet	Ave./Acre Vol. Bd. Ft.
			Hardwood	Softwood		
1	10.4	White Pine Hemlock 2	7176		176	690
2	19.0	Red Maple-Red Oak White Pine 3-4	35202	64966	100168	5272
3	13.2	Hemlock, Red Oak 2	126249	74923	201082	15233
4	24.4	White Pine-Red Maple 4-2	19309	276521	295830	12424
5	30.6	Birch, Red Maple Red Oak 3	67044	19306	86350	2822
6	14.2	Red Maple, Birch White Pine 3-4	9668	45159	55127	3882
7	37.2	White Pine - Red Maple 4-3	38169	255126	293259	7884
8	28.2	White Pine - Red Maple 4-3	50561	54530	105091	3727
9	8.7	Red Maple-White Pine 3-5	12267	81858	94125	10819
10	14.0	White Pine, Red Maple 3	5922	25123	31045	2217
11	28.9	Red Maple, White Pine, Birch 4	20697	109595	127632	4416
12	20.7	White Pine, Red Maple 3	13134	55903	69037	3335
TOTAL	249.5		405398	1063037	1468435	5886

Tract: Blackwater

Inventory Date: 6/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 1

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	13.2	WP RO 4+3	Leave - High Check in 10 years		
2	11.9	WP RO 4+3	Sawtimber Harvest Medium 10-15 years		
3	28.8	RO RM 3+4	Recreation Area Development 15 yrs		
4	21.1	WP RM BR 4+3	TSI Medium 10-15 yrs		
5	12.5	WP 5	Sawtimber Harvest High 5-10 years		
6	7.9	WP RM 3	Sawtimber Harvest Medium 10 years		
7	37.6	WP 3+4	Sawtimber Harvest Medium 10 years		
8	46.1	HE WP RM 3+4	Thin High 5-10 years		
9	6.2	WP 2+3	Thin High 5-10 years		
10	14.3	WP 3+4	Sawtimber Harvest Medium 10-20 yrs		
11	36.8	WP RO RM 3+4	Sawtimber Harvest Medium 10-15 years		
12	19.8	WP 4+5	Sawtimber Harvest High 5-10 years		



13	5.2	WP RM R 4+3	Sawtimber Harvest Medium 10-15 yrs
14	13.0	WP 3+4	Leave - High Check in 10 years
TOTAL	274.4		

Tract: Blackwater

Inventory Date: 7/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 2

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	32.1	WP RM 4-3	Sawtimber Harvest Medium 10 years		
2	29.8	WP 5-4	Sawtimber Harvest High 5 years		
3	20.6	WP RM SP 5-3	Sawtimber Harvest High 5 years		
4	13.5	WP 3-4	Leave Check - 10 years		
5	10.7	WP 4	Sawtimber Harvest Medium 15 years		
6	43.1	HE RM 4-3	Sawtimber Harvest Medium 20 years		
7	34.3	WP HE 4	Sawtimber Harvest Medium 10-15 year		
8	19.5	RM SP WP 3-5	Leave Check - 10 years		
9	24.6	HE 3-4	Cull Removal Medium 10 years		
10	38.4	HE WP BR 3-4	Harvest Sawtimber Medium, 10-12 years		
11	25.8	WP HE 4	Sawtimber Harvest High 10 years		
12	31.1	HE WP 3-4	Harvest Sawtimber Medium 10-20 year		
13	12.3	HE RO BR 4-3	Sawtimber Harvest Medium 10 years		

14	26.2	WP HE 5-4	Sawtimber Harvest High 10 years
15	30.3	WP RO 4-3	Sawtimber Harvest Medium 10 years
16	28.2	HE 4	Sawtimber Harvest Medium 15 years
17	28.9	HE RM 3	TSI Medium 15 years
18	45.2	WP RM 4-3	Sawtimber Harvest High 10-15 years
19	33.5	WP SP RM 4-3	Sawtimber Harvest Medium 15 years
20	30.0	HE 4-3	TSI Medium 10 years
21	16.8	WP HE 4-3	Sawtimber Harvest Medium 10 years
22	18.9	WP RP 3-4	Sawtimber Harvest Medium 15-20 years
23	9.1	WP 3-2	Leave Check - 10 years
24	16.8	WP 4	Harvest Sawtimber Medium 10 years
25	32.6	WP HE 4	Sawtimber Harvest Medium 10 years
26	42.5	RM E RO 4	Leave Check-10 years
27	24.2	RM BR 4	Leave Check-10 years
28	21.9	WP HE 4	Sawtimber Harvest Medium 10 years
29	27.9	HE WP RM 4-3	Leave Check-10-15 years
30	13.0	WP RO 4-3	Sawtimber Harvest Medium 15 years

31	8.5	WP BR 1-2	Check-10 years Leave
32	9.4	WP BR 3-2	Thin Medium 5-10 years
33	13.5	HE WP 4	Sawtimber Harvest Medium 10-15 years
34	9.6	SP RM 3	Leave 10-15 years Check
35	6.9	WP-RM SP 4-3	TSI Medium 10 years

Tract: Blackwater

Inventory Date: 7/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 3

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	21.0	White Pine 5	Sawtimber Harvest High 5-10 years		
2	17.7	Hemlock, Red Maple, Birch 3	Sawtimber Harvest Medium 15-20 years		
3	13.9	Hemlock 4	Sawtimber Harvest Medium 10 years		
4	12.2	White Pine 4	Sawtimber Harvest Medium 8-10 years		
5	10.8	Red Maple 2-3	Leave Check in 10 years		
6	9.0	White Pine-Red Maple 5-3	Sawtimber Harvest High 5-10 years		
7	4.1	White Pine 2-3	Leave Check in 5-10 years		
8	10.3	Red Maple 3	Leave Check 10-15 years		
9	8.1	White Pine-Tamerac Red maple 3-2	Wildlife Mgt. TSI High 10 years		
10	24.2	White Pine 4-5	Sawtimber Harvest High 5-10 years		
11	4.6	Hemlock, Red Maple, Spruce 3	Sawtimber Harvest Medium 15 years		
12	15.4	White Pine, Red Oak, Red Maple 4	Sawtimber Harvest Medium 15-20 years		

Tract: Blackwater

Inventory Date: 7/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 4

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	11.8	WP RO 4-3	TSI - MED		
2	19.2	WP RP 4	Harvest-High-10 Yrs		
3	31.0	WP RO 4	Harvest-High-10 Yrs		
4	32.4	HE WP 4	Harvest-Med-12 Yrs		
5	9.6	RM WP 4	Leave-10-15 Yrs		
6	25.7	RM RO 4	Leave-10-15 Yrs		
7	15.1	HE RM RO 4	Harvest-Med 12 Yrs TSI-Med		
8	13.8	RM 4	Leave-10-15 Yrs		
9	7.1	WP RP 4	Harvest-Med-12 Yrs		
10	12.5	HE WP RO 4	Harvest-Med 10 Yrs		
11	21.1	WP 4-3	TSI-Med Harvest-Med-15 Yrs		
12	22.8	WP RO 4	Harvest-High 8-10 Yrs		
13	6.4	RM BR SP 3	Leave 10-15 Yrs		
14	8.3	WP RO RM 4-3	Harvest-Med-10 Yrs		
15	6.4	HE RO 4	Harvest-Med-10 Yrs Cull Removal-Med		
16	25.2	HE WP 4	Harvest-Med-10 Yrs		
17	12.9	WP RO HE 4	Harvest-Med-8-10 Yrs		
18	22.5	WP RO HE 4-3	Harvest-Med-10 Yrs		

19	12.0	WP 5-4	Harvest-Med-10 Yrs
20	8.4	WP RO HE 3-4	Harvest-Med-15 Yrs TSI-Med

Tract: Blackwater

Inventory Date: 7/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 5

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	9.4	Hemlock, Red Oak 4	Leave Check in 10 years		
2	32.4	White Pine - Red Oak 4-3	Sawtimber Harvest High 10 years		
3	25.7	Red Oak-Hemlock White Pine 3-4	Sawtimber Harvest High 10 years		
4	12.7	Red Maple, Birch, Elm 3	Leave Check in 19 years		
5	20.1	White Pine Red Oak 4	Sawtimber Harvest Medium 15-20 years		
6	22.6	White Pine, Red Oak, Red Maple 4-3	Sawtimber Harvest Medium 10 years		
7	5.7	Red Maple, Red Oak, Hemlock 4	Leave Check in 10 years		
8	10.1	Red Maple, White Pine 3	TSI Medium 10 years		
9	19.3	Red Oak, Red Maple, Birch 4	Sawtimber Harvest Medium 10-15 years		
10	15.3	Red Oak, Red Maple 4	Sawtimber Harvest Medium 10 years		
11	7.8	White Pine Birch 3	Leave Check in 10 years		
12	15.6	Red Oak, White Pine-Red Maple 4-3	Sawtimber Harvest High 10 years		



13	24.1	Hemlock, White Pine, Red Maple 4	Leave Check in 10 years
14	24.1	White Pine, Red Pine 4	Sawtimber Harvest High 5-10 years
15	10.0	White Pine-Red Maple, Birch 4-3	Sawtimber Harvest High 10-15 years
16	12.0	White Pine, Red Oak 4	Sawtimber Harvest Medium 10 years
17	15.3	Red Oak, White Pine 3	Leave Check in 10 years
18	6.7	Red Maple, Elm 3	Leave Check in 10 years

Tract: Blackwater

Inventory Date: 7/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 6

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	17.8	White Pine 3-4	Sawtimber Harvest Medium 15 years		
2	10.7	White Pine, Birch 3	TSI Medium 10 years		
3	23.4	White Pine-Red Maple, Birch 4-3	TSI High 5 years		
4	13.8	White Pine 4-5	Sawtimber Harvest High 5 years		
5	11.8	White Pine 2-3	TSI Medium 15 years		
6	7.6	Red Oak-Red Maple 4-2	Harvest Medium 15 years		
7	17.4	White Pine-Red Maple 4-3	Sawtimber Harvest High 5-10 years		
8	19.3	White Pine, Aspen Birch 3	TSI Medium 10 years		
9	12.5	Red Pine 2-3	Leave Check in 10 years		
10	4.9	White Pine, Red Maple 4	Sawtimber Harvest Medium 10 years		
11	24.3	White Pine, Red Pine 4	Sawtimber Harvest Medium 15 years		
12	33.5	White Pine, Red Oak 4-5	Sawtimber Harvest Medium 15 years		
13	28.0	White Pine, Hemlock 4	Sawtimber Harvest Medium 15 years		

14	14.7	White Pine 4	Sawtimber Harvest Medium 10 years
15	8.6	White Pine, Red Oak 4	Sawtimber Harvest High 10 years
16	22.7	White Pine 4-3	Sawtimber Harvest Medium 10 years
17	9.3	Red Maple, White Pine 4	Cull Removal Medium 10 years

Tract: Blackwater

Inventory Date: 8/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 7

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	21.6	WP BR 3-2	TSI High 5 years Harvest med-10 years		
2	13.4	HE RO 4	Harvest med 10 yrs TSI med 10 years		
3	18.4	RM BR 3	TSI high-5 yrs		
4	21.8	HE BR 4	Harvest med 10 yrs		
5	27.5	RM WP 3-5	TSI high 5 yrs Harvest med 10 yrs		
6	21.7	RM HE 3	Harvest med 10-15 yrs		
7	15.4	WP HE 4-3	Harvest med 10 yrs		
8	16.8	WP AS 3	TSI-high-5 yrs		
9	19.3	HE WP 3-4	Harvest-med-12 yrs TSI-med-10 yrs		
10	20.8	HE WP 4	Harvest-high-8-10 yrs		
11	26.4	WP RO 4-3	Harvest-med-10 yrs		
12	18.1	WP-RO HE 4-3	TSI-high-5 yrs Harvest-med-15 yrs		
13	8.4	WP RP 4	Harvest-med-10 yrs		
14	11.5	HE WP 3-4	Harvest-med-10 yrs		
15	31.1	HE RO 4-3	Harvest-med-10 yrs		
16	21.1	RO WP RM 4-3	Cull Removal-m-10 yrs Harvest-med 10 yrs		

17	35.1	RM RO 4	Harvest-med-10 yrs
18	21.6	RM WP 3-4	Harvest-med-10-15 yrs
19	34.4	WP RP 4	Harvest-med-10-15 yrs
20	12.9	RP 2-3	Leave Check 10 yrs
21	13.2	WP RO 4-3	Harvest-med-10 yrs
22	13.9	RM 4	Leave-Check 10 yrs

Tract: Blackwater

Inventory Date: 9/77

STATE-LAND FOREST INVENTORY  
FOREST OPERATIONS SUMMARY

COMPARTMENT 8

<u>Stand No.</u>	<u>Acres</u>	<u>Forest Type- Size Class</u>	<u>Recommended Operations</u>	<u>Date</u>	<u>Status (Indicate Proj. No.)</u>
1	10.4	White Pine Hemlock 2	TSI High 5-10 Years		
2	19.0	Red Maple-Red Oak White Pine 3-4	Leave Check in 10 Years		
3	13.2	Hemlock, Red Oak 4-2	Sawtimber Harvest High 5-10 Years		
4	24.4	White Pine-Red Maple 4-2	Sawtimber Harvest High 10 Years		
5	30.6	Birch, Red Maple Red Oak 3	TSI Medium 10 Years		
6	14.2	Red Maple, Birch White Pine 3-4	TSI Medium 5-10 Years		
7	37.2	White Pine-Red Maple 4-3	Sawtimber Harvest Medium 10 Years		
8	28.2	White Pine-Red Maple 4-3	Leave Check in 10 Years		
9	8.7	Red Maple-White Pine 3-5	Sawtimber Harvest High 5-10 Years		
10	14.0	White Pine, Red Maple 3	TSI High 5 Years		
11	28.9	Red Maple, White Pine, Birch 4	TSI Medium 10 Years		
12	20.7	White Pine, Red Maple 3	Leave Check in 10 Years		

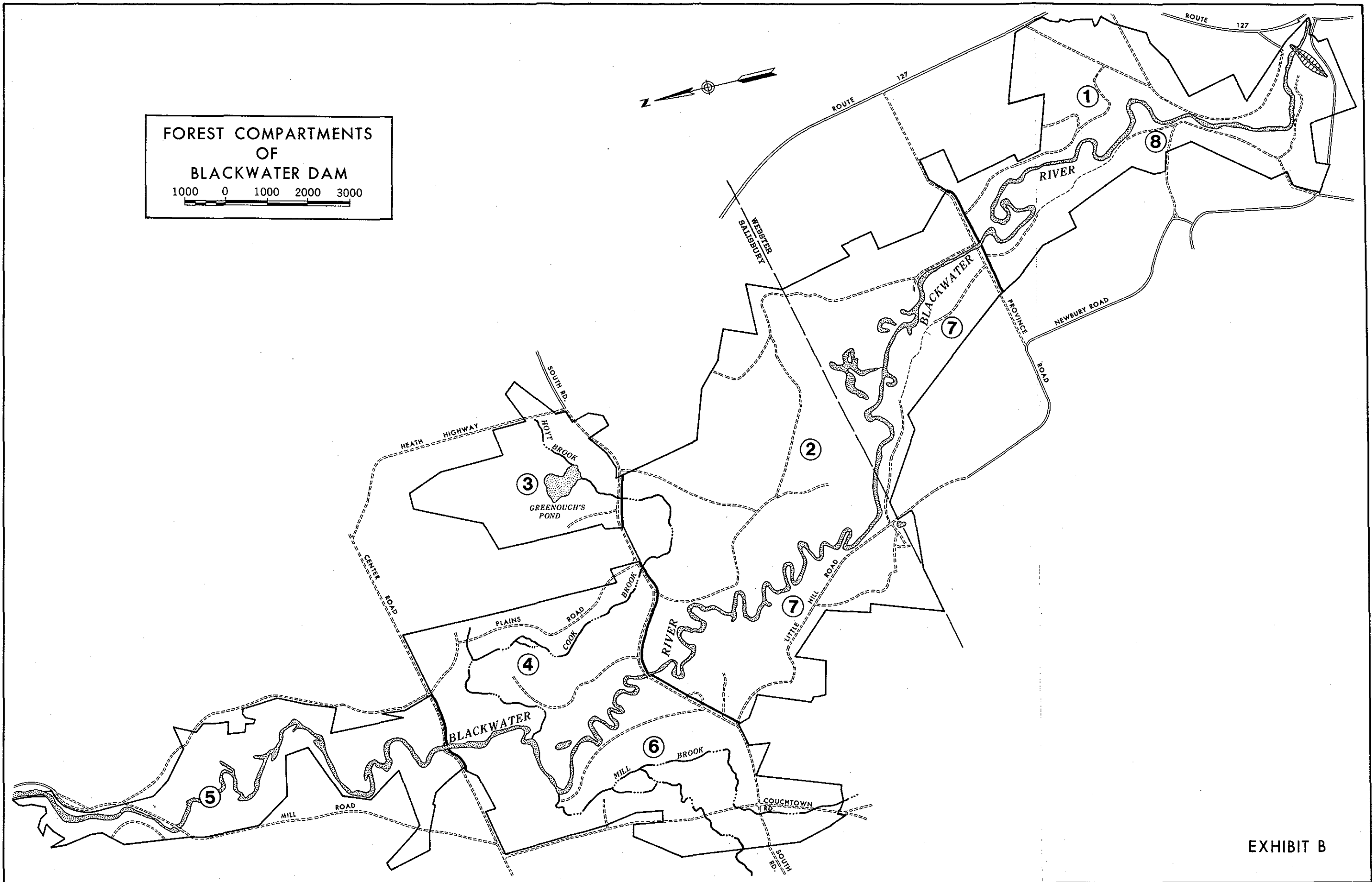


EXHIBIT B